OCTOBER 8, 1960

Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS

AFRICA Special Report ..... P. 49

California Standard revamps chemical organization in bid for boosted sales p. 37

Rubber accelerator research quickens to meet needs of new elastomers p. 91

COPPER: PROCESS CHANGES BOOST ITS MARKET OUTLOOK ....p. 72

Glycol poser: where to grow

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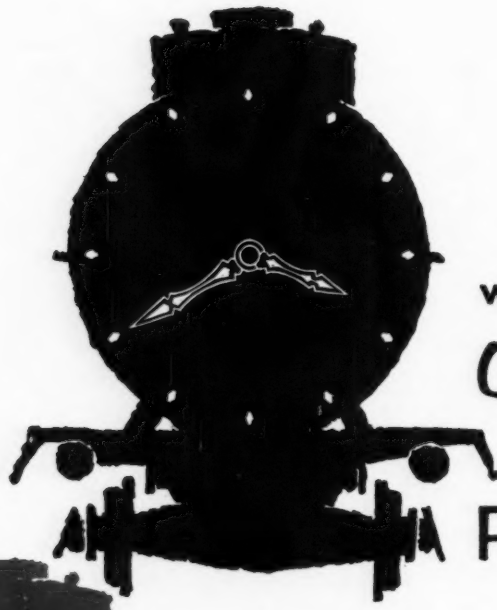

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ON THE COVER: Molten oxide slag spills from a Pierce-Smith copper converter at the Nevada Mines Division of Kennecott Copper Co., near McGill, Nev.

Vol. 87, No. 15 OCTOBER 8, 1960

Chemical Week

5 **VIEWPOINT**— Industrial developers should offer facts on new-plant sites.

9 **LETTERS**

9 **MEETINGS**

17 **BUSINESS NEWSLETTER**

37 California Chemical becomes an operating company—with big growth plans.

39 Pipelines make news: ruling on rates, LPG project, coal-slurry study.

40 Despite profits on one-product operations, sulfur firms seek diversification.

41 Firmer tone noted in latest chemical sales and earnings figures.

41 Bigger capital outlays for paper shape up for '61 as companies launch expansions.

45 **WASHINGTON NEWSLETTER**

49 **CW SPECIAL REPORT: AFRICA**— A look at the CPI opportunities.

72 **ENGINEERING**— Copper processing modernizes to meet aluminum, plastics challenge.

79 **ADMINISTRATION**—CPI executive pay growth fails to match industry average.

82 International Chemical Workers Union readies new organizing drive.

83 Europe hikes stress on management development; competition is keen.

87 **TECHNOLOGY NEWSLETTER**

91 **RESEARCH**— New rubber curing agents try for share of $38-million/year market.

99 **SPECIALTIES**— Chemically modified potato starches get stiffer sales push.

100 Hotel association expands lists of certified specialties products.

100 Paint sales in '60 are setting new records in early months.

102 Novel urethane-based clear finish is promoted for durability.

107 **SALES**— Prospect of waterway tolls spurs organized opposition; CPI is on antitoll side.

108 Air Reduction takes second big step in distributor education program.

113 **MARKET NEWSLETTER**

117 **MARKETS**— No new markets in sight to keep ethylene glycol growth at high rate.

123 **PRODUCTION**—A day in the life of a process supervisor.

130 **BUSINESS BENCHMARKS**

Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., James H. McGraw (1860-1948), founder. EXECUTIVE, EDITORIAL, CIRCULATION AND ADVERTISING OFFICES: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Telephone, LO 4-3000; Teletype, TWX N. Y. 1-1636; Cable, McGRAWHILL, N. Y. Place of publication: Philadelphia, Pa. Second class postage paid at Philadelphia. (See below for directions regarding subscriptions or change of address.) OFFICERS OF THE PUBLICATIONS DIVISION: Nelson L. Bond, president; Shelton Fisher, Wallace F. Traendly, senior vice-presidents; John R. Callaham, vice-president and editorial director; Joseph H. Allen, vice-president and director of advertising sales; A. R. Venezian, vice-president and circulation coordinator. OFFICERS OF THE CORPORATION: Donald C. McGraw, president; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, executive vice-presidents; L. Keith Goodrich, vice-president and treasurer; John J. Cooke, secretary.

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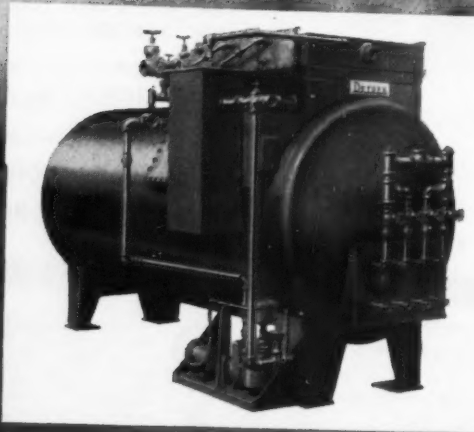

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Be Specific on Site Problems

COMING UP SOON IN CALIFORNIA is a boat trip up the Sacramento River to give businessmen and local officials a look at the potentials that exist there for siting new industry. Indeed, as our regional analysis indicated a couple of weeks ago (*CW, Oct. 1, p. 39*), there's a lot in the area to attract chemical makers. The boat trip is an example of what communities, states, or private groups can do to entice new earnings into their territories.

But we have a caution. For years now we've been assembling material on regions of the U. S. and their attractiveness to the CPI. In doing so, we've become firmly convinced that most cities, many states, and a few private organizations—such as utilities—really don't know what it is they have to sell, or, for that matter, not to sell. We can hark back to regions that have promoted the finding of uranium, when a geiger counter would be hard put to it to muster up a tick. We can recall other areas that have launched broadsides at industry citing glittering generalities, but were later unable to tell chemical management the most elementary specific facts relating to raw materials, taxes, labor conditions, living conditions, transportation and the host of other important factors it wants to know before it can intelligently decide whether to move into an area.

Editorially, it's been our job to spot the rhinestones in the diamonds, call attention to them, or cast them out.

Now we find a new voice commenting on the problem. Last month, Paul Smith, tax manager at Union Carbide, told delegates to the National Tax Assn.'s 53rd annual conference that "piecemeal programs of industrial development, piecemeal legislation, piecemeal tax adjustments, and the like, are out of date in today's highly competitive and complex economy."

"Industry," he continued, "does not want vague answers when recommendations must be made to top management. Each community has a responsibility to convince the investor that it can best serve his requirements and needs. Initial overtures can be made to industry, but the time comes when definite answers to key questions must be made by those capable of speaking in the interest of the community."

To Mr. Smith, we say, "Hear, hear." And, we'd like to add, CPI management has a responsibility too—to do as Mr. Smith has done in being specific on industrial development problems. It's a job that few have yet undertaken, but that many can effectively do.

The Right to Operate

LOOKING THROUGH a chemical union newspaper the other day, we spotted an editorial headlined "Does Management Have Right to Operate Struck Plant?"

In substance, it says, now that unions have convinced everybody they have the right to strike, the right is sometimes comparatively meaningless for practical purposes because of the ability of employers to keep on operating. The union thinks maybe it should be against the law for a plant to be operated when its employees are on a duly voted and legal strike.

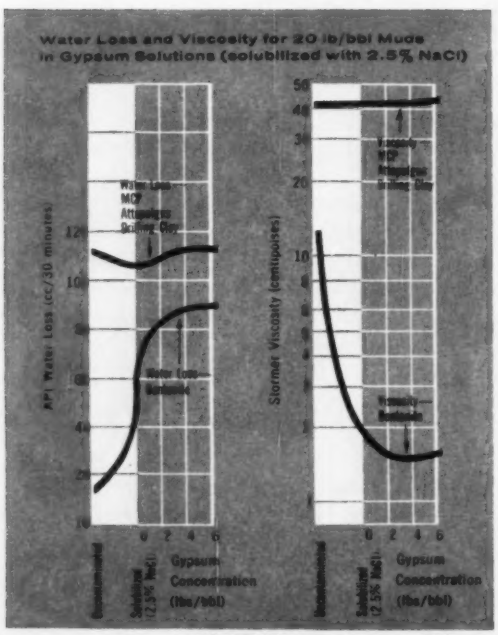
Now, as they usually do, the unions want both to eat and have their cake by taking away one of the few effective strike defenses management has. What next?

news briefs...

ON THE CREATIVE USE OF MCP PROCESS MATERIALS

Oil Well Drillers: higher yields without costly treatment when using MCP's improved Attapulgus Drilling Clay

Gyp, salt, oil emulsion, and completion muds — MCP's Attapulgus Drilling Clay is lower-cost than bentonite in just about any drilling mud. Why? **Substantially higher yields, and continued stability in the presence of field contaminants** without requiring costly chemical treatment. Graph shows evidence of comparative performances in gyp solutions. Viscosity and water loss rate of the Attapulgus Drilling Clay suspension is practically unchanged, from initial make-up in fresh water throughout continued build-up of gypsum concentration. However, the bentonite suspension solution shows a steady loss in viscosity and increase of water loss rate. Get the rest of the story on MCP's improved Attapulgus Drilling Clay . . . check the coupon . . . it will bring you TI-552, a 12-page bulletin just off the press.


Water Loss and Viscosity for 20 lb/bbl Muds in Gypsum Solutions (solubilized with 2.5% NaCl)
API Water Loss (cc/30 minutes)
Stormer Viscosity (centipoises)
Gypsum Concentration (lbs/bbl)
Gypsum Concentration (lbs/bbl)

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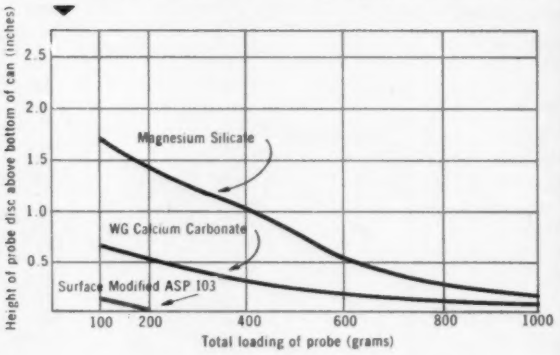
Required fineness of grind in shortest time, long shelf life are assured for organic surface coating systems using MCP's Surface Modified ASP 103 . . . graphs present proof. Other benefits: stability, weatherability, color integrity — ASP's are water-washed to uniform particle size and shape, virtual chemical inertness. There's much more to the role of ASP's in surface coatings . . . this is a **starred** item . . . use the coupon.

Patton Pigment Settling Gauge measures settling characteristics of paints. A weighted probe passes down through paint in quart can, at half-minute intervals distance above bottom is read and load increased. Readings provide a profile of settled pigment.

Results of Patton Pigment Settling Gauge tests on three formulations.‡ Each formulation was ground 5 hours and set on the shelf for 35 days. Then the settling characteristics were measured. Interpretation of results: The higher the reading, the more settling and the harder the body of settled pigment. In the ASP 103 formulation, the weighted probe went completely through the paint to the bottom of the can with minimum weight, in minimum time.



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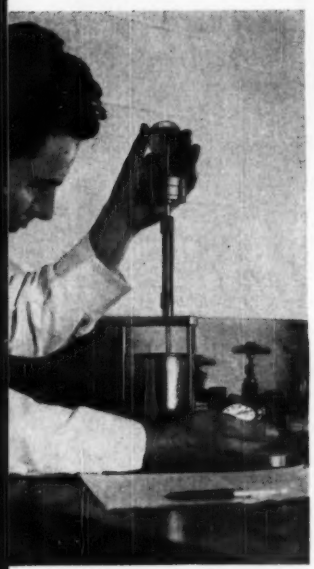
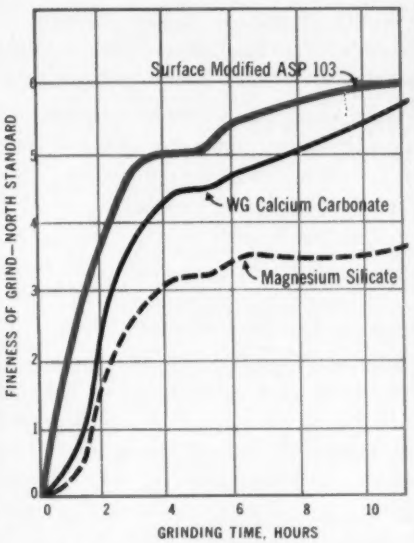
(equal volumes)

Comparison of rates for achieving fine grinds for three formulations.‡ Results with the ASP 103 formulation prove the case for achieving shorter grinding times, lower costs.





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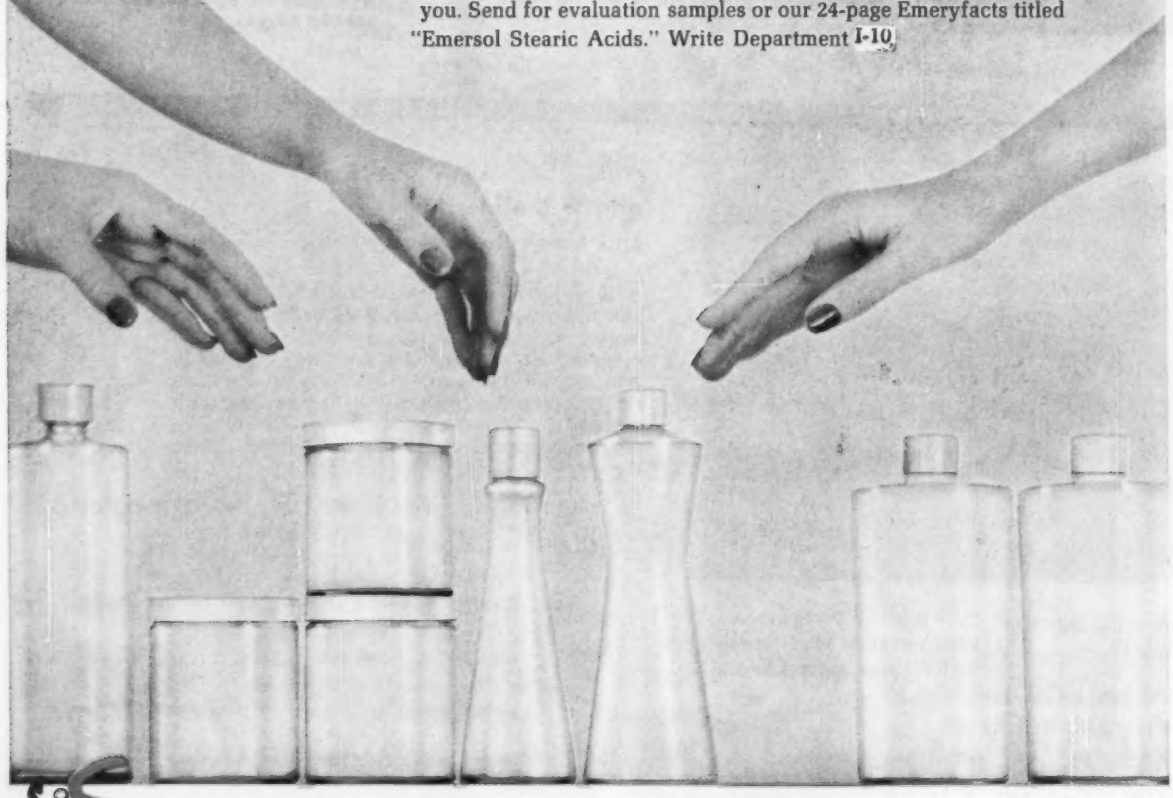

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LETTERS

Not Exclusive

TO THE EDITOR: [Re] . . . construction of a tonnage oxygen plant by Dravo for Ford Motor Co. . . .

We were delighted, of course, to see this project highlighted (*CW, Aug. 20, p. 24*). But in the second paragraph, your story states that Dravo will handle this business "on an exclusive basis." This is incorrect. . . .

In this arrangement with Linde AG., our particular interest is going to be in the steel industry. In addition, we intend to exert efforts in other fields where gas separation plants have application.

GEORGE J. NEWHAMS
Dravo Corp.
Neville Island
Pittsburgh, Pa.

To make the distinction extra-explicit: Steel companies that want Linde-Fraenkl gas separation plants may apply to Dravo Corp.; companies in other-than-steel industries may deal with various engineering and construction firms, including Dravo.—ED.

No Fluoride Mouthwash

TO THE EDITOR: A misleading statement concerning Metal & Thermit Corp. appears in "Dentifrice Marketing on a New Battleground" (*Aug. 20, p. 93*). Your story states that we are ". . . also working on an idea for a stannous fluoride mouthwash." This is incorrect.

Metal & Thermit has no intention of marketing a stannous fluoride, or any other type of mouthwash.

A. J. FISHER, JR.
Executive Vice-President
Metal & Thermit Corp.
New York

Another Stamfordite

TO THE EDITOR: . . . You listed a number of CPI-related laboratories in "Stamford: Self-Styled Lab Haven" (*Aug. 27, p. 97*).

Absent from this list was Chemical Process Corp., a company devoted solely to research in the chemical field, specializing in development of catalysts for the organic and petrochemicals industry.

While our company is modest in size and only two years old, it has developed a new and superior catalyst for the manufacture of maleic anhydride. This catalyst is now in commercial production by Davison Chemical for two clients, one in England and one in the United States.

Chemical Process Corp. is also currently engaged in a number of other development problems, including phthalic anhydride by the fluidized-bed process.

ROBERT B. EGBERT
President
Chemical Process Corp.
Stamford, Conn.

MEETINGS

International Plastics Congress, Amsterdam, Holland, Oct. 10-12.

Technical Assn. of the Pulp and Paper Industry, 10th corrugated containers conference, jointly sponsored with Technical Section, Canadian Pulp and Paper Assn., Royal York Hotel, Toronto, Can., Oct. 10-13.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Oct. 11.

The Magnesium Assn., 16th annual convention, Pick-Carter Hotel, Cleveland, Oct. 17-19.

Technical Assn. of the Pulp and Paper Industry, 15th plastics-paper conference, Hotel Syracuse, Syracuse, N. Y., Oct. 17-19.

Commercial Chemical Development Assn. (New York) and Chemical Economics Division of Chemical Institute of Canada, joint meeting, theme: "The Chemical Industry—Canada and the U.S.A."; Queen Elizabeth Hotel, Montreal, Oct. 18.

The Parenteral Drug Assn., Inc., annual convention, Hotel Statler Hilton, New York, Oct. 19-21.

American Institute of Chemical Engineers (New York Section); themes: "Unconventional Sources of Electrical Energy"; "New Developments in Chemical Engineering"; "Anatomy of a Profession"; Hotel New Yorker, New York, Oct. 20.

Technical Assn. of the Pulp and Paper Industry, 15th engineering conference, Robert Meyer Hotel, Jacksonville, Fla., Oct. 24-28.

Western Petroleum Refiners Assn., question-and-answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark., Oct. 26-27.

Fiber Society, fall meeting, Washington Hotel, Washington, D.C., Oct. 27-28.

Building Research Institute, 1960 fall conferences, sessions on "preassembled components" and "structural foams," Shoreham Hotel, Washington, D.C., Nov. 15-17.

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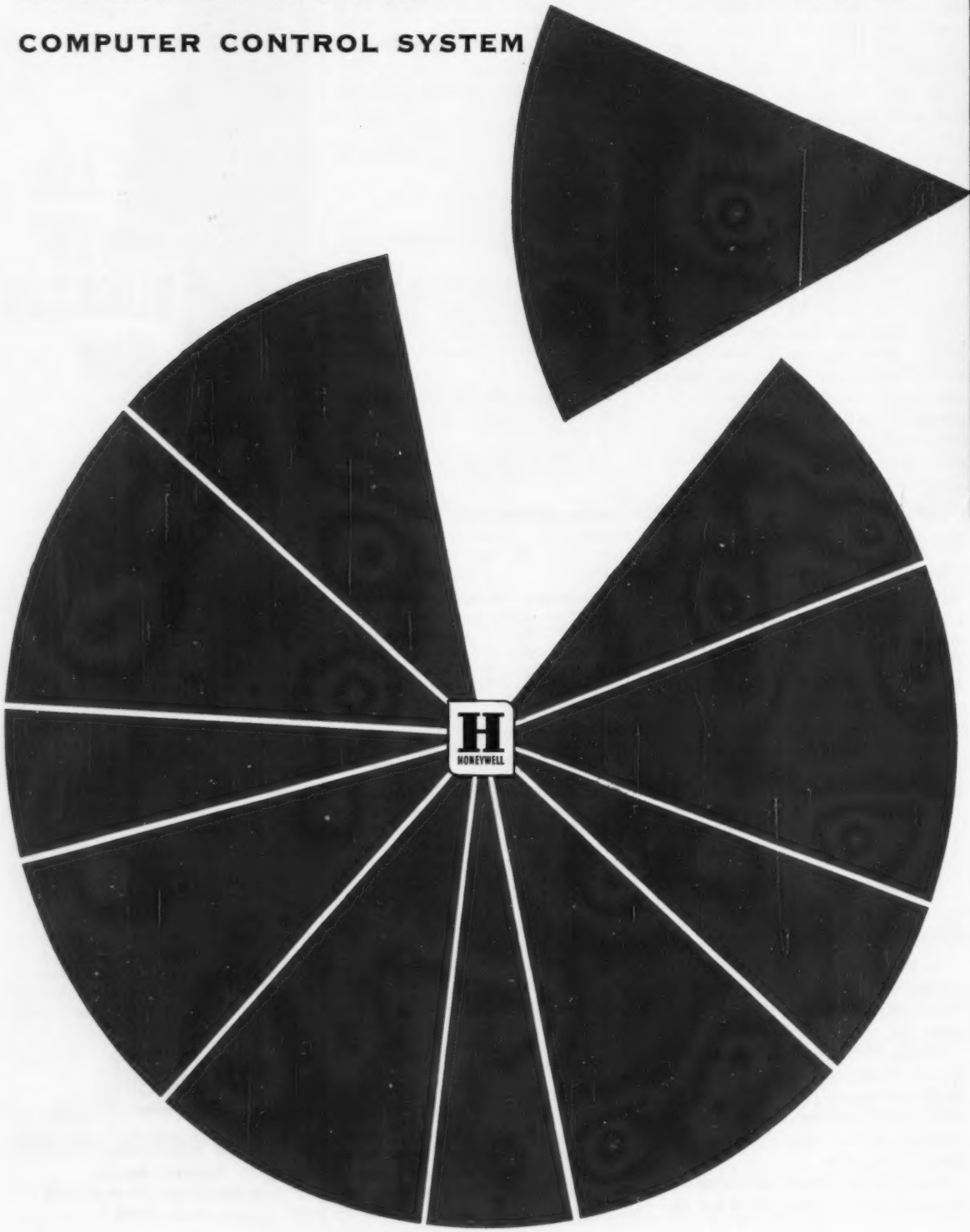

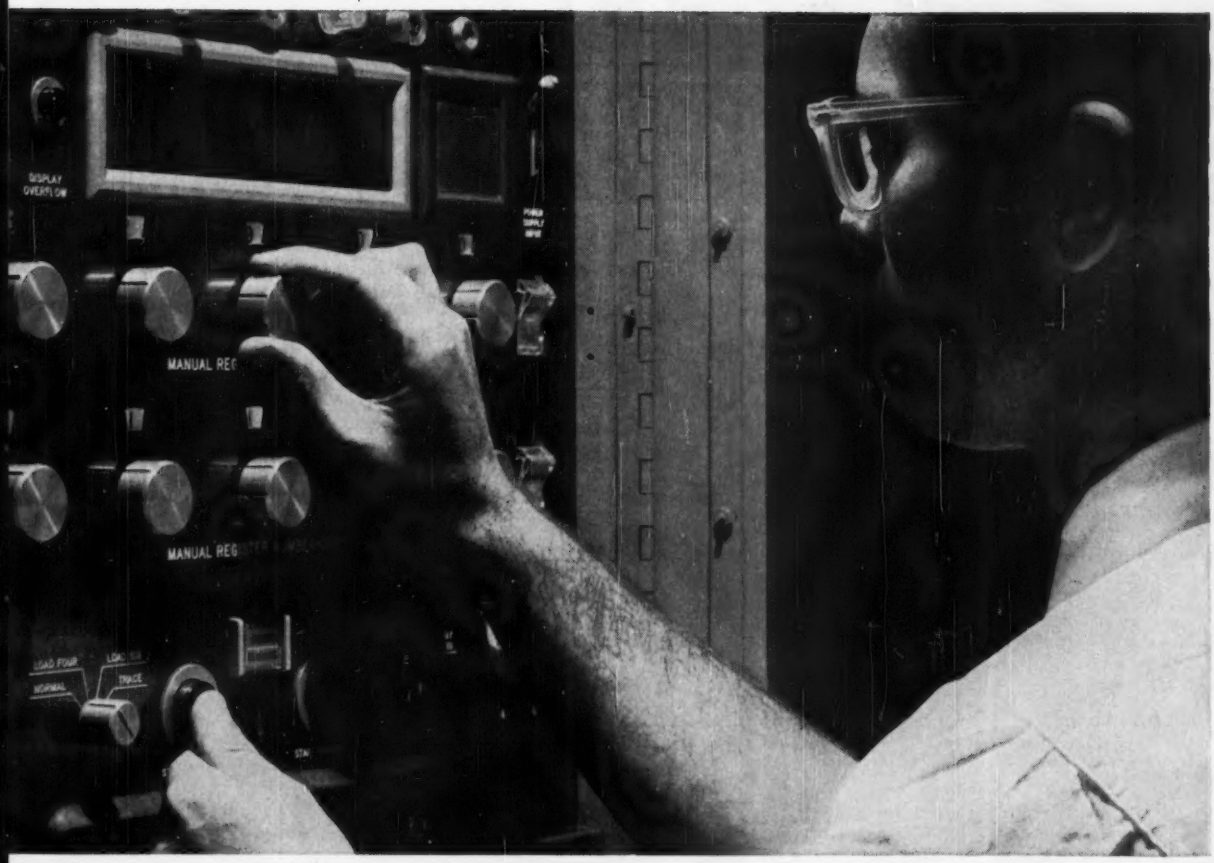

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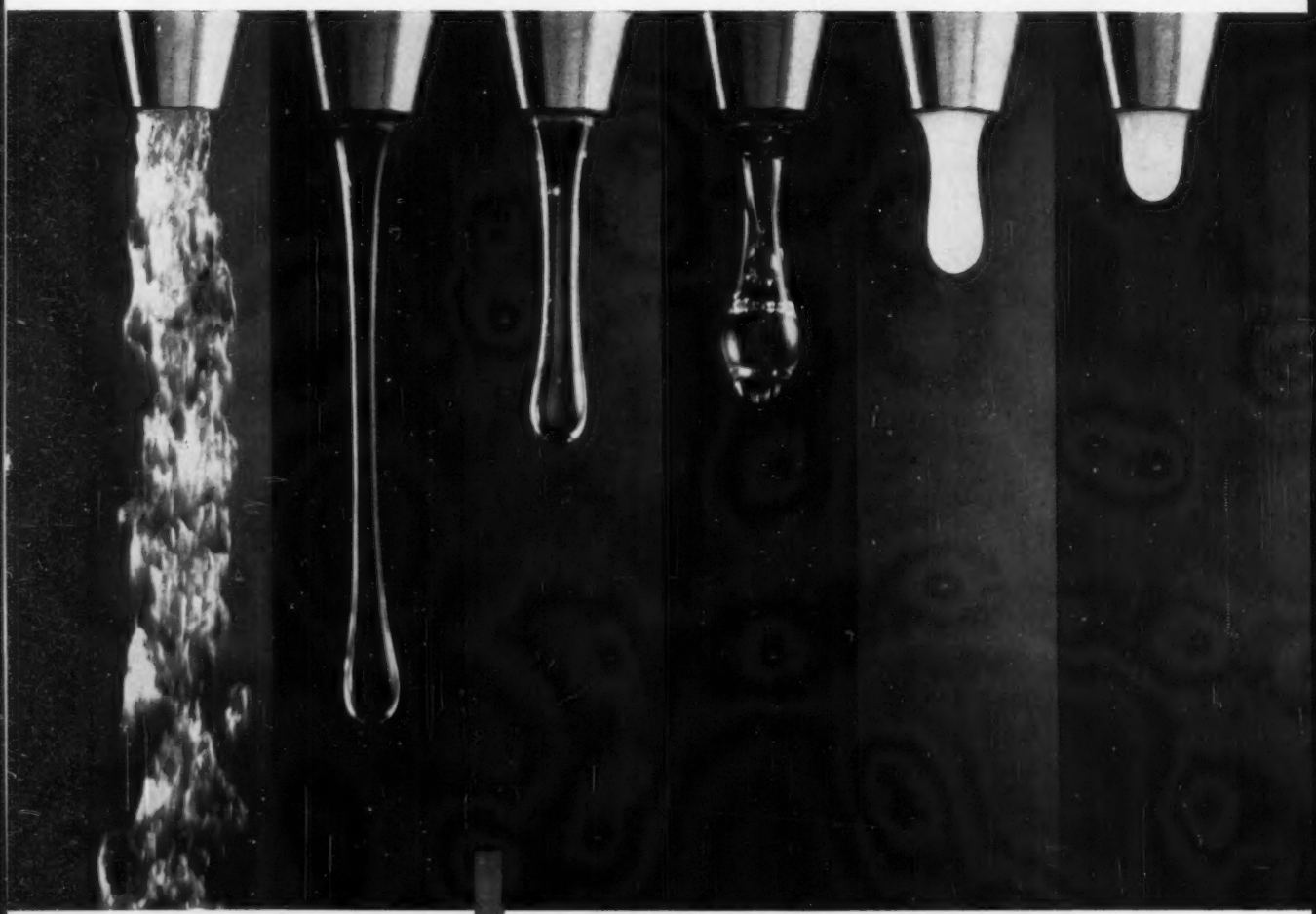
EMULSIFICATION

EMULSIFIER INTERMEDIATES, by their almost unlimited number and properties, allow many emulsion formulations not possible with the usual commercial emulsifiers. Two such intermediates, polyglycols and alkanolamines, are outstanding for their ability to form excellent surfactants. Shown below are samples of polyglycols useful as surfactant intermediates and which are available in a virtually limitless range of viscosities.



For tailor-made surfactants, use these polyols from "the men that make the most of them"

PROPERTIES OF DOW POLYGLYCOLS

	description	viscosity range cks, 100°F.	approx. sol. g./100g. water at 25°C.
POLYETHYLENE GLYCOLS E200-E20,000*	viscous liquids to hard solids	20 to solid	∞
POLYPROPYLENE GLYCOLS P250-P4000*	viscous liquids	27.7 to 545	P250-400 ∞ P1200 2 P2000 up <0.1
POLYBUTYLENE GLYCOLS B500-B2000*	viscous liquids	58 to 258	all <0.1
POLYEPICHLOROHYDRIN 450-1150*	viscous liquids	387 to 3650	all <0.1
POLYSTYRENE GLYCOLS 500-750*	viscous liquids	10830 to 26000	all <0.1

*Numbers indicate average mol. wt.

ESTERIFICATION

WIDE SOLUBILITY, LOW TOXICITY MAKE POLYOLS EXCELLENT SURFACTANT INTERMEDIATES

Excellent ability as surfactant intermediates is shown by many of the Dow polyglycols. Because of the extremely wide choice of Dow compounds in this class, chemists can use them in surfactant production and be highly specific about low toxicity, low reactivity, specific solubilities in water and organics, and other properties.

Polyglycol intermediates used in the production of fatty-acid esters give controlled surface action useful in washing, softening, dyeing, and finishing. Being nonionic, the polyglycol fatty acid esters are important as suspending agents for dye pigments and as emulsifiers for oils and greases in fat liquoring. These esters find wide use as surfactants, dispersants, and wetting agents. Hydrophobic polyglycols can be converted to surface-active agents by sulfation, polyethylation, or reaction with other water-solubilizing intermediates.

Dow is basic in polyols. By having the widest line of starting oxides (ethylene, propylene, butylene, styrene, and epichlorohydrin), Dow has the ability to produce an unlimited number of new compounds. And by being a producer of all starting and intermediate materials, from hydrocarbon to oxide to glycol to polymer, Dow achieves a polyol quality which is a standard for the industry.

In addition to the availability of the polyglycols formed by adding a single oxide to a single glycol, Dow has developed a technology covering an unlimited number of variations using other starting materials. (See chart.)

SPECIFY NEEDED SURFACTANT PROPERTIES THROUGH DOW POLYOL VARIATIONS

SINGLE OXIDE + SINGLE GLYCOL

These are represented by all the standard Dow polyols described at the left. They are all available with complete technology.

ADDITION OF TWO OR MORE OXIDES TO A POLYOL

Problems that affect the "single" polyglycols above can often be overcome by multiple-oxide compounding. Example: high molecular weight polypropylene glycols have many useful properties but they are insoluble in water. Dow polyglycol 15-200, made from two oxides, is soluble in both water and organic solvents.

ADDING PROPYLENE AND ETHYLENE OXIDE TO MATERIALS OTHER THAN GLYCOLS—Starting materials such as propylene oxide or ethylene oxide reacted with phenols and fatty acids are used in making several surfactants valuable as emulsifiers, detergents, and wetting agents. The important property achieved is surface activity resulting from a proper balance of oil solubility and water solubility in the molecule.

ADDING COMBINATION OF OXIDES IN "BLOCKS"

Usually, when two or more oxides are used, they are added simultaneously and the resulting polyglycol represents a compromise between the properties of each oxide. However, adding oxides separately—by block addition—means that the properties of each may exist side by side. Many surfactant manufacturers use the block addition method to get the right hydrophilic-hydrophobic balance for surface activity.

Find out how "tailor-made" Dow polyols can solve problems or improve your existing products for you. Write to "The men that make the most of them."

SAPONIFICATION

MIXED ISOPROPANOLAMINE GIVES SOAP BETTER SOLVENCY AND COLOR STABILITY

Mixed isopropanolamine, a new member of the Dow alkanolamine family, has superior emulsification characteristics (better solvency and color stability) while retaining most of the desirable characteristics of other alkanolamines. Like triethanolamine, mixed IPA combines with free fatty acids to form soaps. These soaps find wide use as emulsifying agents for low-cost, easily prepared, stable emulsions. But here's a valuable difference. The soaps of mixed IPA are *completely* soluble in hydrocarbons such as naphtha, gasoline, and mineral oil in all proportions whereas TEA soaps are not. This property of mixed IPA yields solvent emulsions with greater stability.

Color stability is another outstanding characteristic of mixed IPA. Both the increased emulsion stability and the resistance to color change are important in products subject to long storage periods or extended shelf life. Mixed IPA may be substituted pound-for-pound for TEA since the equivalent weights of the two are approximately equal. Mixed IPA soaps are used as emulsifiers in dry-cleaning soaps, soluble textile oils, wax removers, metal cutting oils, cosmetics, emulsion paint, and in other products.

MIXED IPA SPECIFICATIONS	
Monoisopropanolamine	10—15%
Diisopropanolamine	40—50%
Triisopropanolamine	40—50%
Apparent Equivalent Weight	137—143
Water, Maximum	0.5%
APHA Color, Maximum	100
Specific Grav. 20/20°C.	1.002—1.012

TYPICAL PROPERTIES	
Freezing Point	−30°C.*
Pounds Per Gallon at 25°C.	8.37
Viscosity at 25°C., centipoises	969
Viscosity at 60°C., centipoises	44.6
Flash Point (Cleve. Open Cup)	255°F.
Fire Point (Cleve. Open Cup)	260°F.
Odor	Slightly Ammoniacal

*Sets to a glassy solid below −30°C.

See "The Dow Hour of Great Mysteries" on TV.

The Dow Chemical Company, Midland, Mich., Chemicals Merch. Dept. 426AM10-8.

☐ Choosing the Right Polyglycol ☐ 15 Series Polyglycols Booklet
☐ Polyethylene Glycols Booklet ☐ Polypropylene Glycols Booklet

Name_____

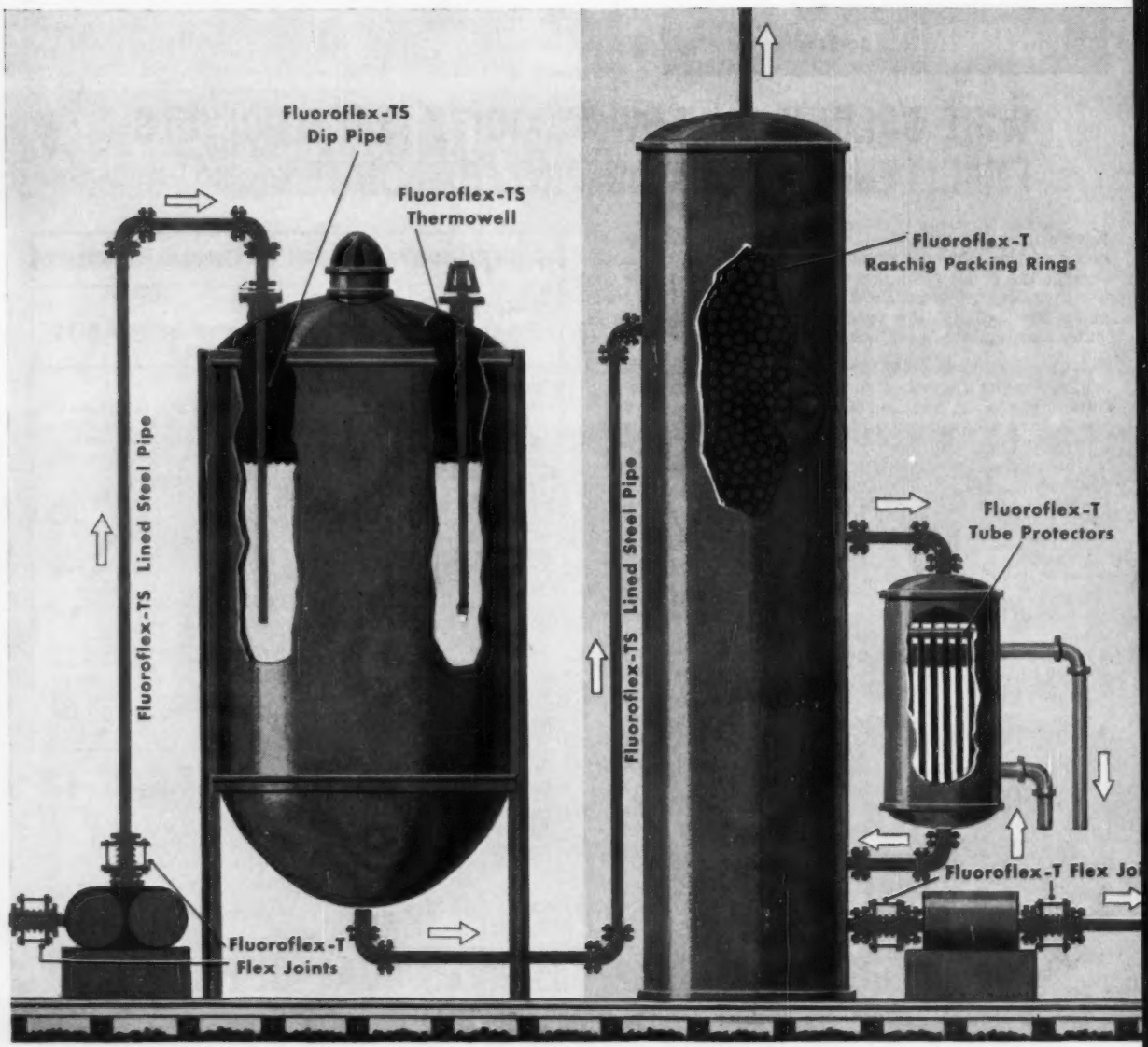
Position_____ **Company**_____

Address_____

City_____ **Zone**____ **State**_____

DOW

THE DOW CHEMICAL COMPANY
Midland, Michigan



HERE'S WHY corrosion-proof fluid-handling production savings,

Check these Fluoroflex-T piping components for economy, installation ease, long life!

FLUOROFLEX-TS—Lined Steel Pipe. Prefabricated to length with flanges—ready to assemble. Minimizes assembly time, shortens checkout time.

FLUOROFLEX-T—Bellows-Flex Joints. Molded rather than machined, for unparalleled flex life. Damp out equipment vibration, adjust to longitudinal and temperature movements, add years to life of equipment and piping.

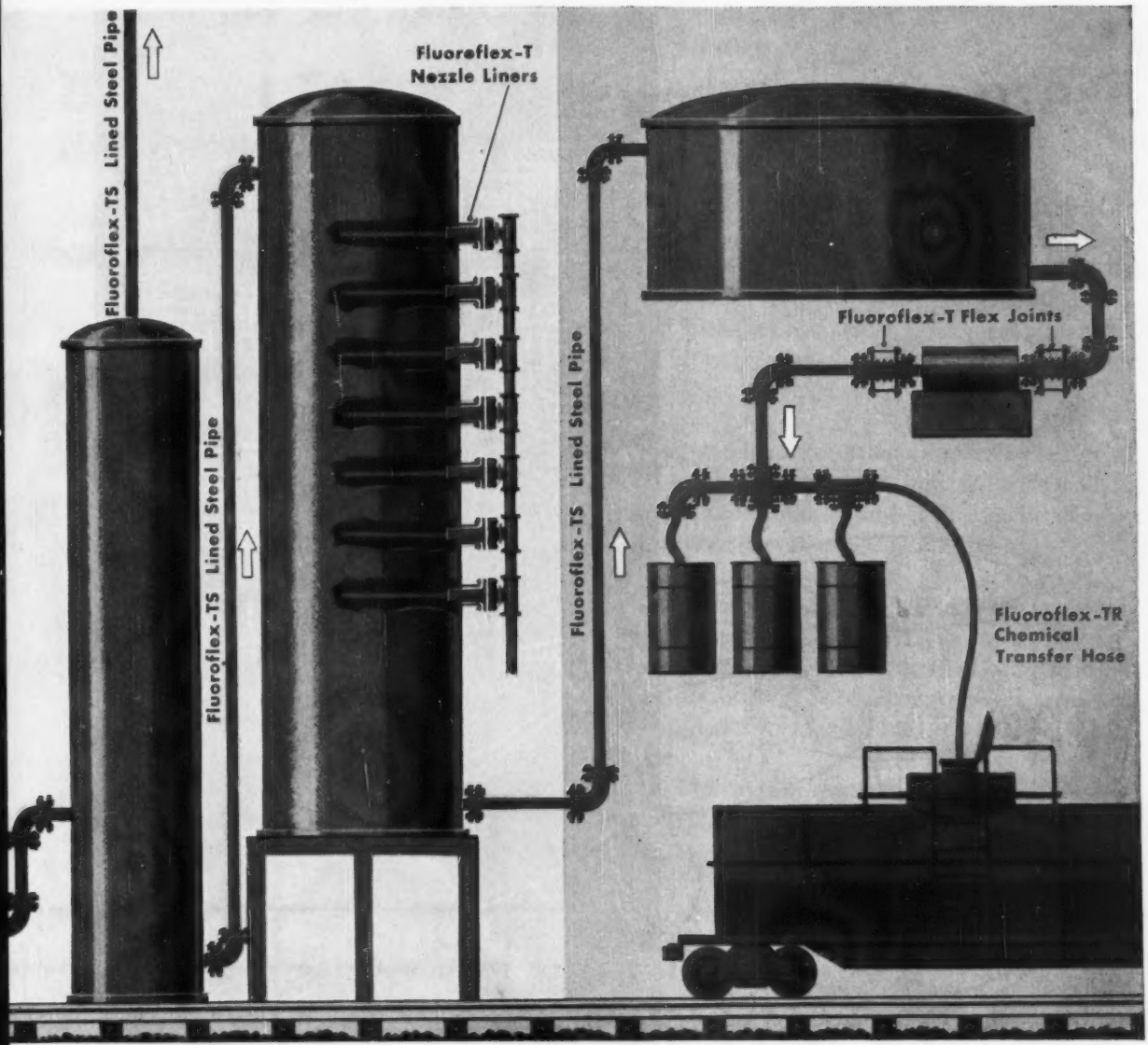
FLUOROFLEX-T—Transfer Hose. Completely corrosion-resistant, long flex life. Cover of rubber or stainless steel braid.

FLUOROFLEX-T—Condenser Tube Protectors. Eliminate erosion and corrosion by high-velocity acid on entry side of condenser tubes.

Also: Raschig Packing Rings • Dip Pipes • Spargers • Thermowells.

Fluoroflex®-T Piping Products as shown above can be used with complete and proven assurance that they will not corrode or build up solids which can contaminate sensitive products. Specially processed of Teflon® resins by patented Resistoflex methods, they can handle the most difficult materials up to 500°F. They are completely resistant to any chemical except high-temperature fluorine and the molten alkali metals.

Fluoroflex-T Piping costs no more on an installed-cost basis than other corrosion-proof systems in common use today. Initial material costs have been



components of FLUOROFLEX-T (TEFLON) assure non-contamination:

lowered by recent price reductions made possible by advanced technology and increasing volume. Installation costs are inherently low as a result of skillful design which features easily-bolted-together units with prefabricated, flanged sections.

Fluoroflex-T Piping costs LESS on a performance basis. Savings in operation are assured—with decreased maintenance, long service life, and the elimination of process headaches and downtime.

So, if *you* have problems of corrosion—want to reduce maintenance or replacement costs and eliminate process downtime or product loss—consult Resistoflex. Write for more information today.

RESISTOFLEX
CORPORATION
Complete systems for corrosive service
Plants **in Roseland, N. J. • Anaheim, Calif. • Dallas, Tex.**
Sales Offices **in major cities**

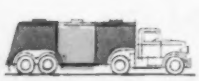
®Fluoroflex is a Resistoflex trademark, reg. U. S. Pat. Off.
®Teflon is Du Pont's trademark for TFE fluorocarbon resins.

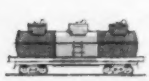
Are you ready to THROW OUT THE BARREL?

(and save money with Epon® Resin bulk shipments)

If you're now buying drums of Epon resin, you can make substantial savings by purchasing bulk shipments in tank car or tank wagon. In many cases this saving may be enough to pay for the installation of your bulk handling system within a year.

Your Shell representative has the facts. He will help you appraise your purchasing record and calculate your savings. Call him today.





SHELL CHEMICAL COMPANY

PLASTICS AND RESINS DIVISION

110 WEST 51ST STREET, NEW YORK 20, NEW YORK

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42-76 Main Street	20575 Center Ridge Road	6054 West Touhy Avenue	10642 Downey Avenue
Flushing 55, New York	Cleveland 16, Ohio	Chicago 48, Illinois	Downey, California
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IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Toronto

SHELL

Business
Newsletter

CHEMICAL WEEK
October 8, 1960

Phillips Chemical will build a polypropylene plant. But it won't be right away, because the company is still working on the process. Also, one other big oil company's chemical subsidiary is about to reveal its plans for a polypropylene project. Another major expansion note: United Carbon will build a $5-million, 64-million-lbs./year carbon black plant in southern California, hoping to win a big piece of the West Coast market—now served by shipment from plants in the Southwest.

•

A slight slackening of the business tempo is reflected in Hooker Chemical's operating data for the quarter ended Aug. 31, with a 0.3% dip in sales and an 8% drop in earnings. Nine-month totals: sales up 0.2%, to $112.2 million; earnings down 7.6%, to $9.3 million.

•

Rohm & Haas will produce methyl methacrylate monomer, acrylic molding powder and ammonium sulfate at the Louisville, Ky., butadiene plant it purchased from the government earlier this year (*CW Business Newsletter, April 30*). After a $12-million, one-year renovating project, onstream date is targeted for midsummer '61.

•

The Tidewater Oil-Collier Carbon and Chemical joint plant for naphthalene production in Delaware (*CW, June 25, p. 95*), although just getting under construction, is already being expanded—to 100 million lbs./year, double its originally planned capacity. Reports are that Tidewater-Collier will also raise capacity of the naphthalene plants it's building in Los Angeles, also originally slated for 50 million lbs./year.

And DX Sunray Oil Co. will begin construction in January of a $1-million Hydeal unit to produce 600 bbls./day of benzene at its Tulsa refinery. Completion date: July '61. Ready Nov. 1 this year will be a Udex unit at Tulsa, also to produce 600 bbls./day of benzene.

•

Air Reduction will triple gas production at its Acton, Mass., plant after only two years of operation (*CW, Aug. 6, p. 53*). Airco will channel some $5.5 million into its Acton plant facilities to boost liquid nitrogen, oxygen and argon capacity from about 1.8 million cu.ft./day to 5.3 million, and electrolytic hydrogen from 5 to 7.5 million cu.ft./month.

•

Drugmakers are under fire again this week as the American Medical Assn. launches a new program aimed at discouraging the use of various over-the-counter drug products. AMA reiterates that self-prescription is not the way to spend health care dollars, suggests that "much of the estimated $350 million/year spent by the public on vitamins could be better spent on food." The $68 million spent annually on aspirin, more than twice that amount spent on laxatives and some $250 million spent on arthritis and rheumatism cures are also considered by AMA to be "largely unnecessary."

Business Newsletter

(Continued)

France will get more petrochemical raw materials from a new aromatics plant to be built by Esso Standard S.A.F., Jersey Standard's French affiliate, at its Port Jerome refinery near Le Havre. The $7-million, 45,000-metric tons/year plant is slated to go onstream during the first half of '52, producing high-purity *p*-xylene, and *o*-xylene, and a variety of aromatic solvents. Esso will also build a hydrogenation unit on the site.

•

Britain's Imperial Chemical Industries reports sales up 15% —to $806.4 million—over first-half '59. This despite a 2% average cut in the home selling prices of ICI's main products. Exports rose 14.5%.

•

Watch for a joint venture between Du Pont and Dow. *CW* hears that the companies are working out arrangements to pool their Mexican fluorspar operations. The deal may hinge on a plan for building a new fluorinated hydrocarbon plant in the U.S. Du Pont is already building a Freon plant in Mexico. Neither company will officially comment on the report.

Du Pont was also reported planning to build a plant in Finland —but the company promptly issued a denial.

•

New plant investments are continuing in the simmering Middle East, despite the Arab boycott, which makes it necessary for incoming companies to take sides.

Miles Chemical Co., division of Miles Laboratories (Elkhart, Ind.), will build a $2-million citric acid plant in Haifa, Israel. Outweighing a likely Arab world boycott of the company and its products (including international big-seller Alka-Seltzer) are a firm local market, taking 50% of the plant's 1,500-short tons/year capacity; high-level Israeli research; and incentives offered by the government (a loan, major tax reliefs, freedom for Miles to take all profits out in dollars).

First approached by Israel was Bzura Chemical Co. (Keyport, N.J.), with its novel black-strap molasses-based process (*CW, Aug. 6, p. 43*). Bzura, although it has been thinking internationally, declined. Reasons: the proposed Israeli plant and market looked too small, and Bzura wanted to watch its new process at home a while longer before moving overseas.

Procter & Gamble will set up a plant for the manufacture of synthetic detergents in Lebanon. The $700,000 investment will be put up by Lebanese interests, headed by Trans-Mediterranean Co. (Beirut), distributor of P&G products in Lebanon, with technical supervision provided by Procter & Gamble AG (Lucerne). The plant will start operation in 12-16 months with an initial capacity of over 2,000 tons/year—enough for local requirements. Later, production may be expanded to serve other parts of the Arab world.

IN ENGLAND
STONE & WEBSTER
ENGINEERS ANOTHER

PERFORMANCE

One of the two Crude Oil Atmospheric Distillation Units and both Vacuum Distillation Units pictured above were designed and completed by Stone & Webster Engineering Limited in 1953 at the British Petroleum Refinery on the Isle of Grain, Kent, England. The second Atmospheric Distillation Unit was completed in 1958, and in addition, two similar units have been provided for the Kuwait Oil Company Limited at Mina al Ahmadi, Kuwait.

Design economies and speed of construction have been by-products of these outstandingly successful units . . . another example of close client cooperation, in this case extending back more than 20 years.

To discover how Stone & Webster can serve your company, call or write our nearest office.

STONE & WEBSTER ENGINEERING CORPORATION

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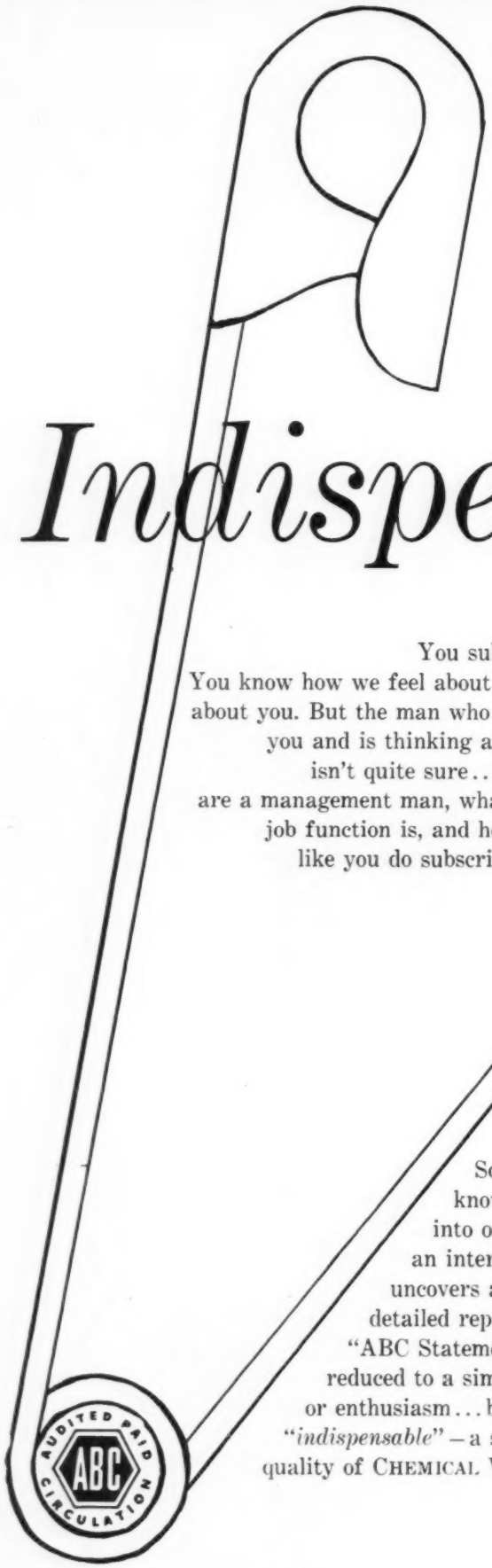

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So twice a year, an independent organization known as the Audit Bureau of Circulations digs into our subscriber records with all the zeal of an internal revenue agent. The facts and figures it uncovers and confirms are then exposed to public view in a detailed report which the advertising trade calls an "ABC Statement." In it your readership and regard for us are reduced to a simple statistic. It doesn't sparkle with sentiment or enthusiasm... but, like we said, there are times when it is simply "*indispensable*" – a solid guarantee of the circulation quality of CHEMICAL WEEK.

Ⓘ—a famous symbol of dependable quality in many packaging fields . . . glass and plastic containers, corrugated boxes, and multiwall bags.

Lambert Hitchcock was the first large-scale manufacturer of furniture in America. The skill and quality which went into his designs have lived for 150 years, as is represented by the famous "Hitchcock Chair."

Think of the maker when you buy any product . . .

It pays to buy bags from a packaging specialist!

So MUCH MORE than just the ability to produce it must be considered when you buy any manufacturer's product. It must be backed by experience, to assure you that the product is properly designed to fit its specific uses . . . by dependability to assure you of exactly what you want, when and where you want it . . . and, of course, by quality.

Owens-Illinois, through its leadership in many fields of packaging, can help you in all your multiwall bag requirements—the *right* multiwall bag for every packing, handling, storage, and shipping method.

For full information,
write to Owens-Illinois,
Multiwall Bag Division,
Toledo 1, Ohio

MULTIWALL BAGS
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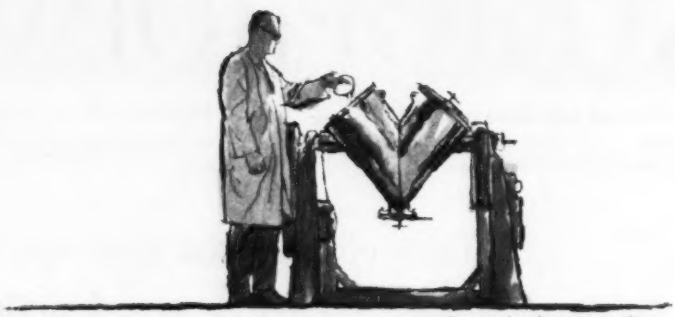
P-K Pre-test Laboratory **reveals obsolescence in solids processing**

Multi-step operations telescope into a single step at the P-K Solids Processing Pre-test Laboratory. This is a lab away from home, a yardstick that predicts savings in materials, labor and investment. » » » The P-K Pre-test Laboratory features the new P-K Solids Processor*. This latest "twin shell" development blends liquids and solids, granulates, vacuum dries, coats, reacts chemicals, sterilizes – performs as many as eleven operations – in simple sequence.



*patented and patents pending

The P-K Pre-test Laboratory is unmatched anywhere. It demonstrates things impossible to see without pilot study, works out subtle variables in blending, granulating and drying, provides scale-up data and operational procedures. We invite you to take full advantage of its facilities—either by bringing or sending your materials to East Stroudsburg. » » » You'll work with well-qualified engineers who have made thousands of resultful pre-tests for processors. They often suggest and produce unexpected product variations. Your guidance will be helpful. » » » Due to heavy lab schedule, we suggest you write or call George Sweitzer today at Stroudsburg. To call direct dial 717 – Hamilton 1-7500. He will supply you with all the pertinent information regarding dates, amount of material required, shipping and travel information.

patterson-kelley

Chemical and Process Equipment Division
116 Burson Street, East Stroudsburg, Pa.

2-NITROPROPANE!

The remarkable solvent that brightens the day for more and more hard-working formulators.

2-NP ($CH_3CHNO_2CH_3$) is an extraordinarily versatile member of the CSC Nitroparaffin family. Its most important property is its strong solvent power for a wide variety of materials including many natural resins, synthetic resins, coating materials, dyes, organic chemicals and fats and oils. Of special interest is the co-solvent effect of 2-NP and/or toluol and alcohol, making it an outstanding solvent for many vinyl resins and acrylics. It is a superior solvent for epoxies and cellulosics.

2-NP is to the newer coatings what butyl acetate has been to nitrocellulose – an ideal solvent. 2-NP's evaporation rate permits maximum flow and leveling without delaying drying time. Unlike ketones, 2-NP in vinyls eliminates problems of solvent residue and solvent odor, too. It has several safety features such as relatively high flash point and a high lower-flammability limit of vapors in air. Write for all the literature that details how CSC's 2-Nitropropane can brighten your day.

Evaporation Rate of 2-NP Compared to Other Solvents (volume)

Acetone	975
MEK	568
Toluol	197
MIBK	186
2-NP	110
n-Butyl Acetate	100
Xylol	69
Cellosolve	38
Isophorone	4.3

Flash Points (°F Tag Open Cup) of 2-NP Compared to Other Solvents

Acetone	16
MEK	30
Toluol	56
MIBK	81
Xylol	85
n-Butyl Acetate	92
2-NP	103
Cellosolve	126
Isophorone	202

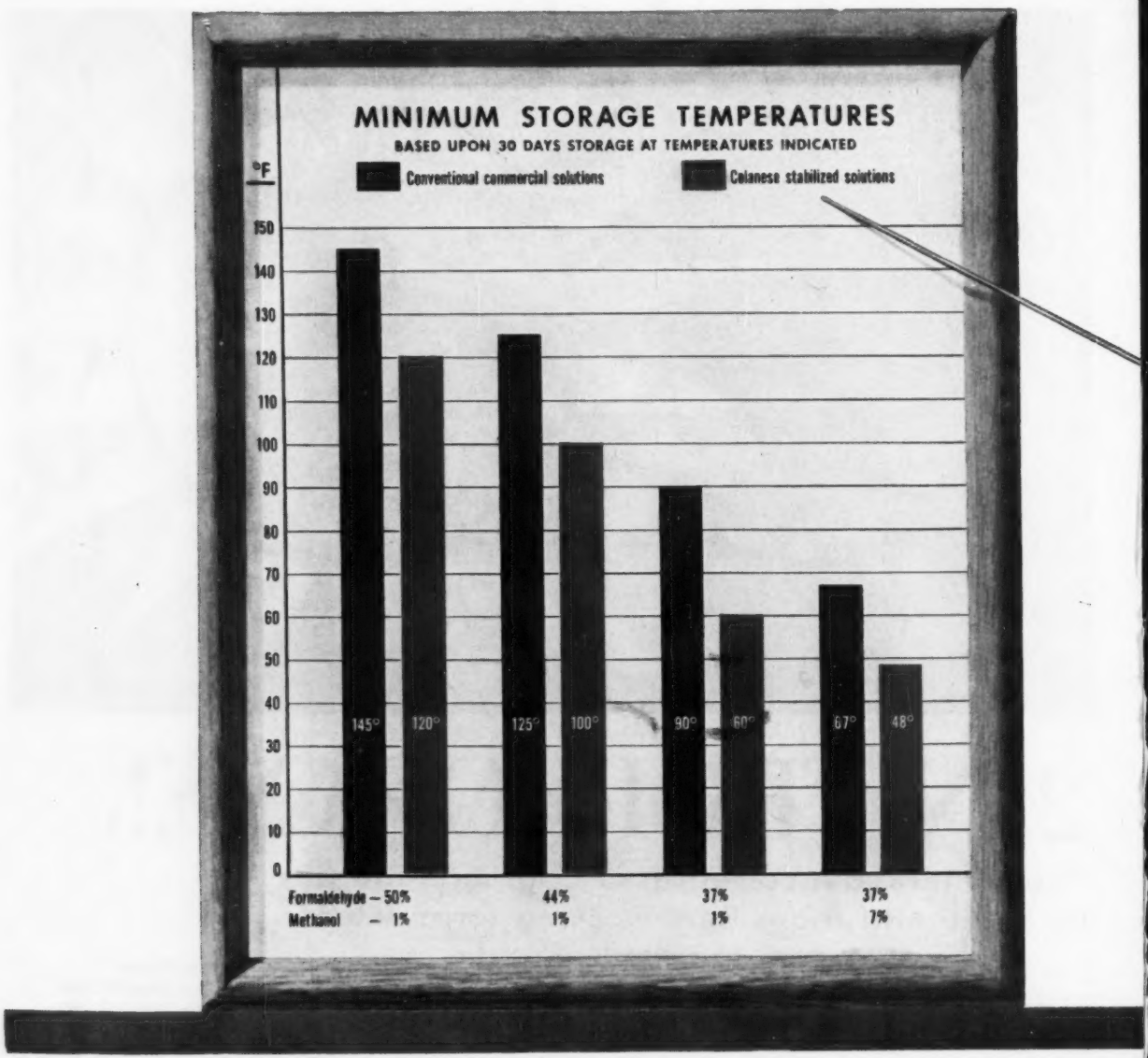
Comparison of Lower Limit of Flammability of 2-NP With Other Solvents (% by volume in air)

MIBK	0.9
Xylol	1.0
Toluol	1.27
n-Butyl Acetate	1.7
MEK	1.8
Acetone	2.15
2-Nitropropane	2.6
Cellosolve	2.6

INDUSTRIAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION

260 MADISON AVENUE, NEW YORK 16, N. Y. • OFFICES IN PRINCIPAL CITIES



STABILIZED

As you see . . .!

The red bars?

Those are minimum storage temperatures for Celanese stabilized formaldehyde.

And the black?

Same thing for conventional HCHO solutions.

What does this show?

Stabilized Celanese formaldehyde solutions can be stored—and shipped—at much lower temperatures!

What does that mean for me?

Significant savings in steam and heating costs for storing formaldehyde!

Any detrimental effects on end products?

On the contrary! Products are often improved. Better, clearer resins are frequently made. This stabilization maintains formaldehyde at lower acidity levels . . . prevents loss of concentration.

Any other gains?

Cuts maintenance costs, too! It reduces clouding, precipitation of paraform, and gumming of formaldehyde tank bottoms. The stabilized chemical goes back into solution time after time if storage temperatures drop below recommended minimums.

How about price?

It costs no more! And it's been thoroughly field tested.

Sounds wonderful! When do you deliver?

Right now! And all you need!

FORMALDEHYDE

Well said, Mr. Salesman. But don't forget that our good customer will want a reminder of other Celanese achievements in formaldehyde, such as low-cost paraformaldehyde and Formcel solutions (formaldehyde in various alcohols). He may be interested in higher concentration stabilized aqueous solutions now that they can be shipped at lower temperatures. Point out that we welcome every question on the subject of formaldehyde—and are ready to help him with the answers!

For more information, write to: Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. 552-I, 180 Madison Avenue, New York 16, N.Y.

Celanese® Formcel®

Celanese CHEMICAL®

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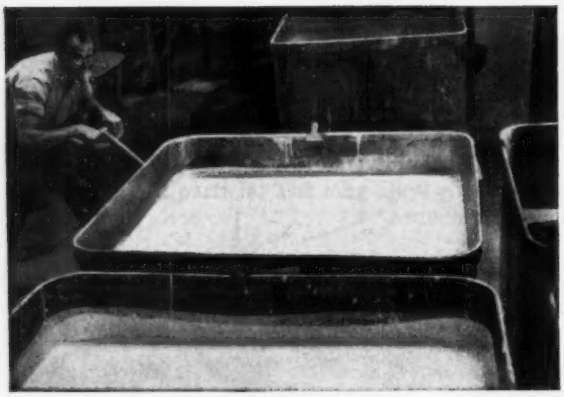
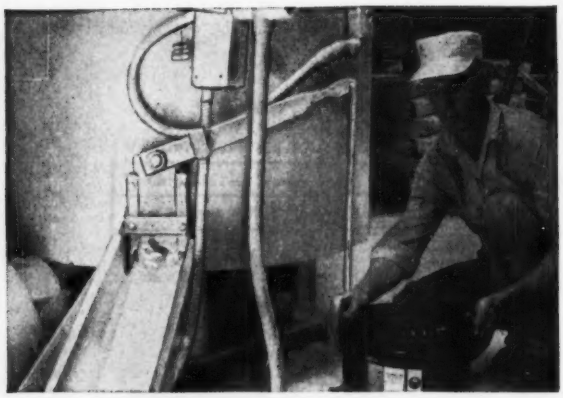


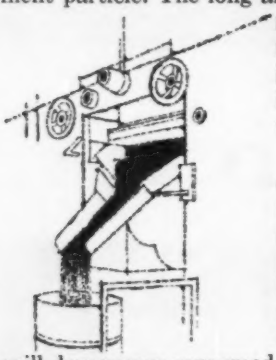


Chemicals from Armour for Pigment

Dispersion of pigments in paint, plastics or rubber is an expensive time- and power-consuming operation. Various materials are being used as "grinding aids" or "wetting agents" with only limited success. Now, Armour *cationic* chemicals supply the answer to rapid and effective dispersion of "problem" pigments where other agents have failed. The flexibility in application of these chemicals allows treatment at any time . . . either at the time the pigment is manufactured or at the time the pigment is dispersed into the medium. These chemicals have definitely established themselves as useful, time- and power-saving aids for pigment dispersion.

Paint and Pigments

Armour's *cationic* surface active agents possess a high degree of affinity for pigment and filler surfaces in the presence of oil or water. The cationic molecule orients itself on the surface of the pigment so the active, polar nitrogen is directly attached to the pigment particle. The long alkyl chain completely surrounds each individual pigment particle and alters its surface properties, causing the pigment particle to be readily oil-wetted.



Use of Armour *cationic* chemicals results in the following advantages: elimination of sweating period, reduction of grinding time, higher grind number reached with fewer passes through roller mill, less power consumed, and less pigment separation in stored paints.

Cationic treatment of pigments can be accomplished at either of two stages. The first involves pretreating the pigment prior to its incorporation into an oil or oleoresinous base. The second method adds the chemical directly to the vehicle or to the pigment-oil paste just prior to grinding. Armour's Duomeen® T (aliphatic diamine) Dioleate is equally effective in either method of use.

The necessary concentration for effective dispersion varies with the type of pigment, but the range is generally between 0.5% and 3.0% based on the dry weight of the pigment.

The table below illustrates the effectiveness of Duomeen T Dioleate in dispersion of Titanium Dioxide (RANC) in a typical alkyd on a 3-roll mill. Note the increase in ratio of pigment to vehicle when 1% of Duomeen T Dioleate is used.

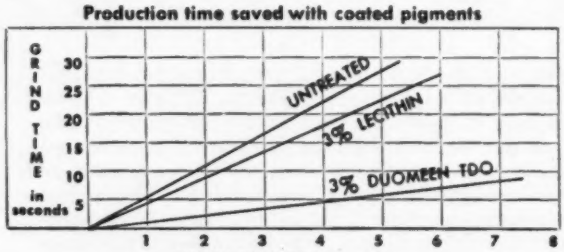
Dispersion of Pigment

Vehicle..... 32% Phthalic Anhydride Alkyd
Vehicle Non-Volatile.. 50% In Mineral Spirits
% Wetting Aid..... 1% Based on Pigment Weight

	Control		Lecithin		Duomeen TDO	
	Lbs.	Gal.	Lbs.	Gal.	Lbs.	Gal.
Titanium Dioxide.....	970	27.8	1060	30.3	1170	33.5
Vehicle.....	547	72.2	521	69.7	500	66.5
Wetting Aid.....	....	....	10.6	....	11.7	....
Total Pounds of Paste...	1517	100.0	1591.6	100.0	1681.7	100.0
Increased Pounds of TiO_2	....	....	90.0	....	200.0	....
Increase % of TiO_2.....	....	....	9.3	....	20.6	....

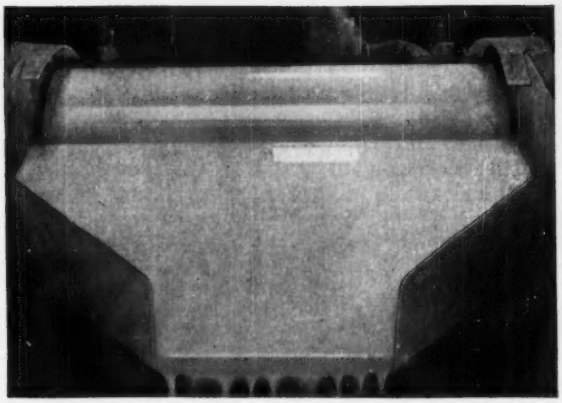
The following graph indicates the relationship of grind time to grind number and illustrates the obvious advantage from the use of Duomeen TDO.

Production time saved with coated pigments



Pigment—Chrome Green Vehicle—24% Phthalic Alkyd (50% non-volatile in M.S.)

Duomeen TDO is effective for rapid dispersion of titanium dioxide, white lead, chrome yellow, calcium carbonate, ultramarine, chrome green, iron blue, toluidine red, black iron oxide, red iron oxide, zinc



Dispersion

oxide, chrome orange, lithophone and zinc chromate yellow.

Duomeen TDO can also be used in pigment flushing techniques. This is accomplished by mixing the water-wet pigment cake into an oil treated with the cationic chemical.

Mixtures of Arquad® 2S (quaternary ammonium chloride) and Ethomeen® S/12 (polyethoxylated amine) are also highly effective coating and wetting agents for pigment-oil systems.

Plastics

The combination of Armour's Arquad 2C and Ethomeen S/12 is used as a coating agents for pigmentation of plastics and plastisols. The use of cationic coated pigments offer numerous advantages in production and in the finished product.

By using pigments coated with these chemicals, manufacturers can lower initial viscosity, improve viscosity stability in plastisols, maintain longer working periods for the plastisols and reduce water and soapy-water extraction. Coatings of Arquad 2C and Ethomeen S/12 will also permit reduced processing time for inclusion of the pigment into the plastisol.

Rubber

Incorporation of precipitated calcium carbonate as a reinforcing agent in rubber is a difficult operation. Precoating the pigment with Armour *cationic* chemicals greatly facilitates the incorporation. Precipitated calcium carbonates may be treated in aqueous slurries by a simple process in which a mixture of 5 parts of Arquad 2C and 1 part of Ethomeen S/12 acetate is added to the slurry. A dilute solution of sodium hydroxide is then added to react with the Ethomeen S/12 acetate which releases sodium acetate and deposits a uniform Arquad/Ethomeen coating on the surface of each pigment particle. The sodium acetate is then removed by simple water washing.

Precoating the pigment in this manner changes the surface character from hydrophilic-oleophobic to hydrophobic-oleophilic, and allows the pigment to be more readily wetted by organic media.

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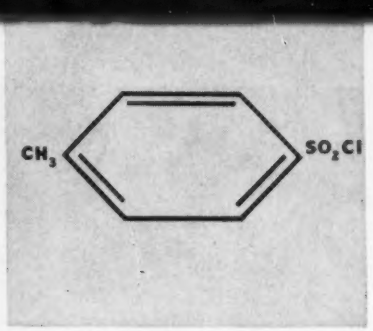
DIETHYL PHTHALATE...formulates low-cost, nontoxic adhesives and coatings.

Concerned about the new Food & Drug laws relating to food packaging? Monsanto's diethyl phthalate offers coatings and adhesives makers a plasticizer with several advantages: it is low in cost, makes extremely quick-tack PVAc emulsion adhesives ... and it has been accepted as "nontoxic" both by the U. S. Bureau of Animal Industry and by the Food & Drug Administration.

Typical uses of diethyl phthalate-plasticized adhesives include boxboard manufacture, sealing tapes, envelope adhesives, and adhesives for food wrapping film. Only 11 parts diethyl phthalate per 100 parts Gelva®-55 (polyvinyl acetate) emulsion makes a stable, quick-tack adhesive, with low-temperature flexibility of −5.0° C. (Modified Clash & Berg Test); a volatility loss of only 4.8% after 20 hours at 87° C.; and oil extraction weight loss of only 0.63% after 24 hours' contact with peanut oil. Diethyl phthalate is one plasticizer that best combines economy and formulating efficiency with fully approved safety of use. Try it.



para-TOLUENESULFONYL CHLORIDE...offers a 3-way cost advantage in chemical synthesis.

Monsanto's new process makes this intermediate one of the most "cooperative" and rewarding of all commercial chemical raw materials ... a versatile reactant for the step synthesis of a variety of organic chemicals.

HIGHLY REACTIVE: With extremely high reactivity at the chlorine atom, PTSC undergoes many replacement reactions with typical hydrogen-containing molecules such as alcohols, amines, reactive hydrocarbons, metal salts of acids ... in fact with almost any organic molecule containing labile atoms. PTSC thus offers multi-directional pathways to a host of profitable commercial chemical compounds.

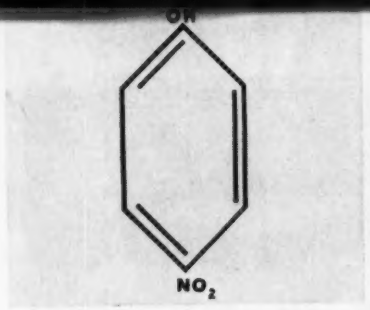
PURE: With a 98% minimum assay, PTSC assures predictable yields for the process, a minimum of troublesome contaminants.

STABLE: Though highly reactive, Monsanto high-purity PTSC can be stored the year round with negligible deterioration ... thus assuring better yields through cleaner reactions that are easier to predict and control. PTSC offers processing savings wherever sulfonic acid chloride reactions can serve in your product synthesis.

Monsanto Task Force Chemicals

Are you tired of getting whipsawed by the profit squeeze? Here are six Monsanto products that might help you push ahead of competitors. They're designed to lower materials cost, short-cut processing time, or "build in" plus values that command higher prices.

Monsanto offers you a whole task force of cost-cutting "quality improvers," including a complete line of fast-acting dispersants ... *seven* FDA-approved nontoxic plasticizers ... and a variety of high-yield intermediates, *heat-defiant* color stabilizers, low-cost resin extenders. Chances are, if your product is made by chemical processing, Monsanto can help you stretch your profit margin. We'll certainly welcome the opportunity to try.



para-NITROPHENOL...high-assay intermediate can cut synthesis costs.

Monsanto *para*-nitrophenol can be a cost-saving base raw material for a number of specialized syntheses. PNP actually offers highest assay at lowest cost.

At 99.0% minimum purity, this high assay eliminates the loss of 3 to 4% water content of ordinary commercial material. The uniform level of concentration can make important money savings through easier, faster, more predictably uniform processing reactions. Used by itself, PNP is a low-cost fungicide and preservative for chrome-tanned leather. In syntheses, PNP offers a valuable reactivity for creating new structures. Its highly reactive phenol hydrogen atom gains an energizing "boost" from the *para* NO_2 group. This phenol hydrogen undergoes replacement by a host of reactive structures that may be derived from sulfonyl chlorides, alkyl halides, phosphoryl chlorides and many others. PNP offers organic chemists a low-cost combination of an OH and an NO_2 radical on an aromatic ring . . . a building block for new chemical structures for insecticides, dyes, and derivatives of *para*-aminophenol. Give your creative imagination a workout with PNP. Likely result: better end products at substantial savings.

SANTOWHITE® POWDER REFINED...controls oxidative degradation of caprolactam, polypropylene, and high-density polyethylene.

Santowhite Powder Refined stabilizes olefins against oxidative heat degradation that causes color build-up during processing and decreased flow properties. At concentrations up to 0.5%, the in-process and residual antioxidant action of Santowhite Powder Refined is almost equal to Monsanto's Santonox® . . . but its color-controlling mechanism is far superior. So, too, is its stabilizing action, compared with compounds such as di-*t*-butyl-*p*-cresol and other alkylene-bis-substituted phenols. For example, Santowhite Powder Refined, when used as an antioxidant for polypropylene and high-density polyethylene, protects these polymers from oxidation for 2.6 hrs. and 5.3 hrs. compared to 0.3 hrs. and 0.8 hrs. respectively for the unprotected controls (as shown by infrared tests on carbonyl build-up). In air oven aging tests, after three days at 150° C., polypropylene samples with Santowhite Powder Refined showed a weight loss due to decomposition of resin of just 0.42% compared with 20.6% loss for the controls. In polycaprolactam, Santowhite Powder Refined improves low-temperature brittleness and makes reprocessing easier by maintaining the melting point. For example, 1% on the resin maintains the melt index within 25% after two extrusions at 290° C., while the unprotected resin increases its melt index over 500%.

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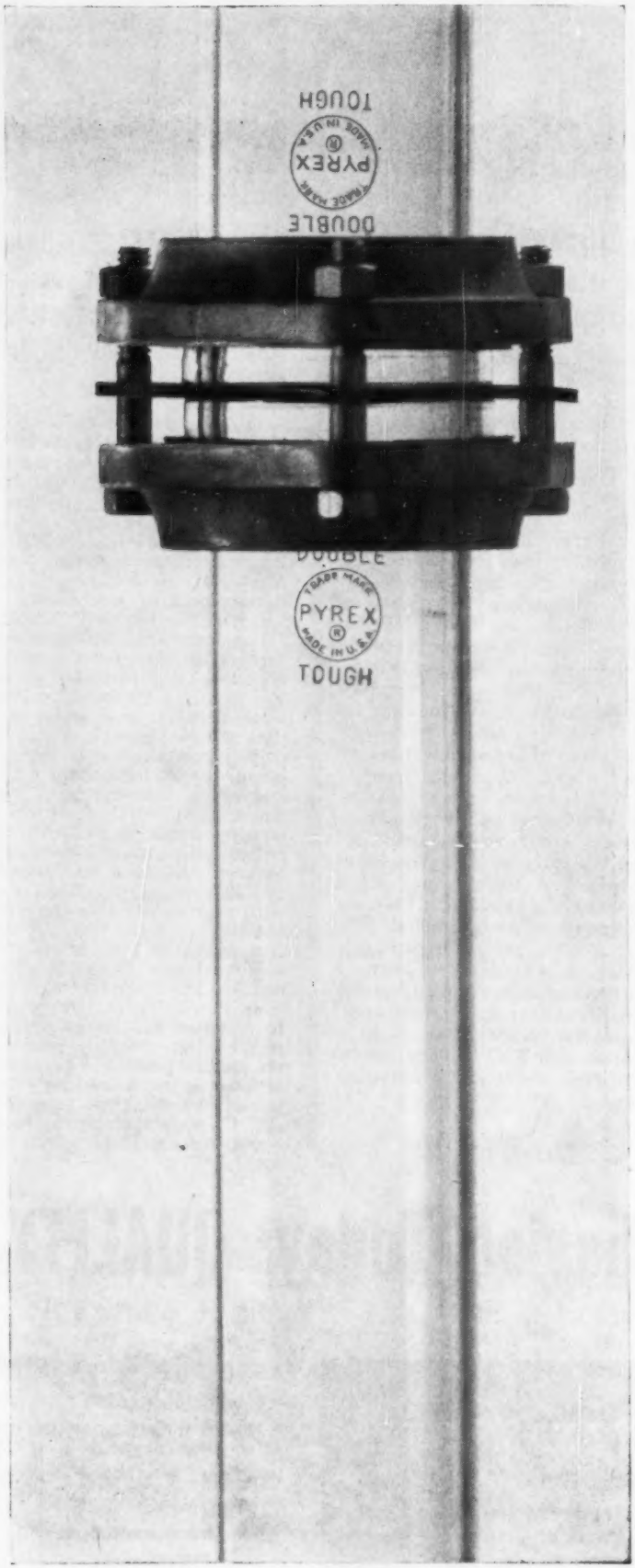

How to run a simple test study on PYREX® pipe and corrosion

A few hours and a few dollars may be enough to end corrosion in your piping altogether.

Choose a process line where you have the worst corrosion. Put in a length or a section of PYREX pipe. Sit back and let the pipe go to work.

We are positive you'll learn two things from this study.

You'll find the PYREX pipe can indeed end your corrosion problems unless you're handling large quantities of hydrofluoric or glacial phosphoric acid, or hot alkalies. Any other chemical or combination of chemicals should slip through without a trace of corrosion.

You'll find that PYREX pipe installs so much more easily and so much faster than most other materials that it is actually one of the least expensive piping materials you can use.

Your local PYREX pipe distributor can show you how to attach this pipe to your present lines—fittings are available for making attachment to any type of process pipe. See our insert in Chemical Engineering Catalog. Or, if you prefer, you can write direct to us for a copy of PE-3, the PYREX Pipe Bulletin. Address: Plant Equipment Sales 2 Crystal Street, Corning, N. Y.

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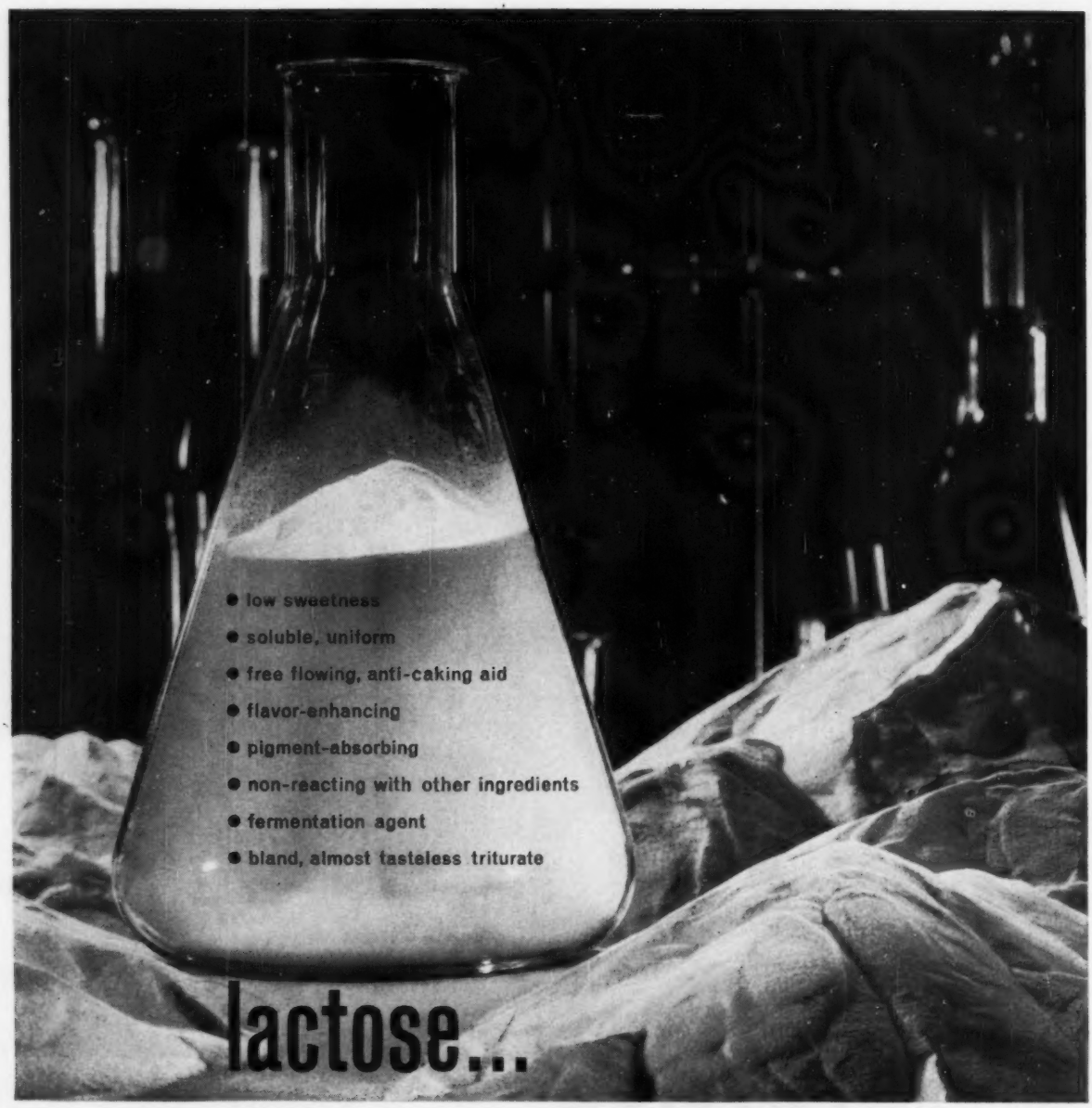

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Experience builds confidence

This is a story about FOAMS... urethane foams

POLYETHER-BASED URETHANE FOAMS, chalking up new successes and spawning new applications at a remarkable rate, are fast becoming one of industry's most exciting developments. Their low cost, ease of application, and variety of forms (ranging from supple flexibility through semi-rigid to most rigid types) have tickled the imagination of thousands. Here are some developments to date:

the widest range of desirable properties of any available industrial foam

more accurate control of degrees of toughness, resilience, weight per unit volume, shock absorbency, insulating properties

marked price advantages over polyester foams and foam rubber

a solvent-blown rigid urethane foam which can be applied with readily available standard portable hot-spray catalyst equipment

But, as with all new developments, experience is an all-important factor. It can prevent costly mistakes, fruitless evaluation, conserve priceless laboratory time, cut costs, and insure greater product satisfaction.

So, if you have an interest in urethane foams — either flexible, semi-rigid, or rigid types — consider these facts:

1. Wyandotte pioneered in the development of the polyethers that have greatly improved urethane foams, given them a longer useful life, lowered their cost, and offered a far wider range of desirable properties.

2. Wyandotte was the first to develop a sprayable solvent-blown polyether rigid foam.

3. Wyandotte has extensive urethane application and development laboratories cooperating with all manufacturers of urethane foams, and with prepolymer manufacturers on the latest urethane-foam formulations.

This valuable experience (and our facilities) are available to you if you make, wish to make, or use urethane foams as a part of your own products or processes. Just write us, describing your requirements in as much detail as possible. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte's urethane-foam raw materials include: PLURACOL® Series of Triols, used for one-shot flexible foams and for the preparation of rigid urethane foams; PLURACOL Diols, used for prepolymer-type flexible foams and to impart strength properties to one-shot flexible foams; TETRONIC® Polyols, for improved resilience and moldability; QUADROL®, a very reactive cross-linking agent and catalyst; DHP-MP, a catalyst with extremely low odor.

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

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the HS 40 W

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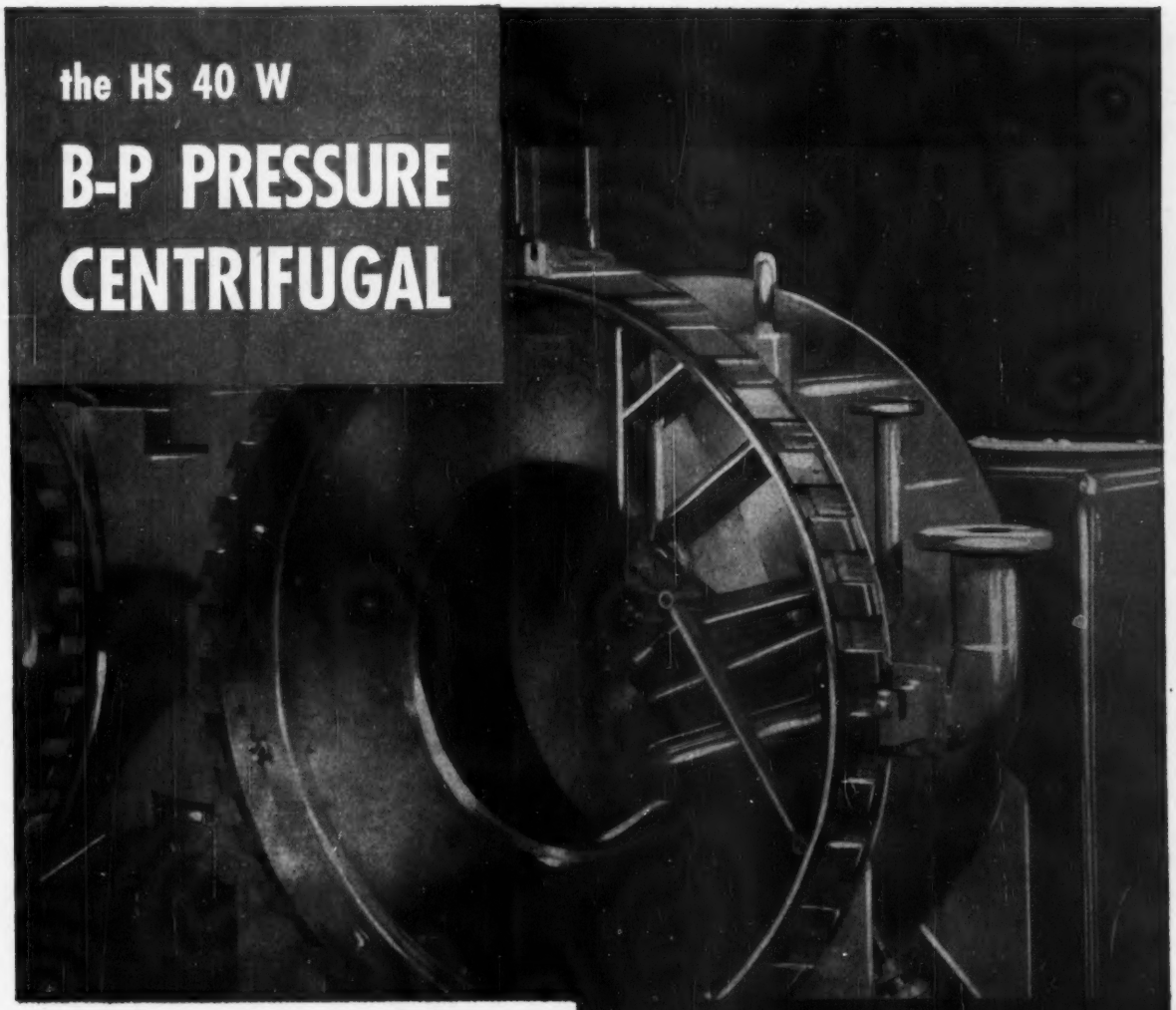

BAKER PERKINS research now brings you the HS 40 W Universal Pressure Centrifugal, engineered for normal operation at 1000 times gravity and internal pressures to 150 psi. Several important features are entirely new: A MECHANICAL SELF-BALANCING SHAFT SEAL is positioned where the main shaft enters the housing and is the only major moving seal. A CLAMPING AND SELF-ALIGNING DOOR SEAL consisting of a floating ring plus two O-rings assures a completely safe lock without the necessity of tightening bolts. A SIMPLIFIED DESIGN OF THE DISCHARGE KNIFE AND CHUTE. Complete discharge of all solids is effected, eliminating swirling or dusting of solids within the housing. PROGRESSIVE PEELING. For the first time, provision is made for the peeler knife to enter the cake at successively increasing depths. Glazing of the heel is eliminated. Air displacement is controlled during both the charging and peeling operations.

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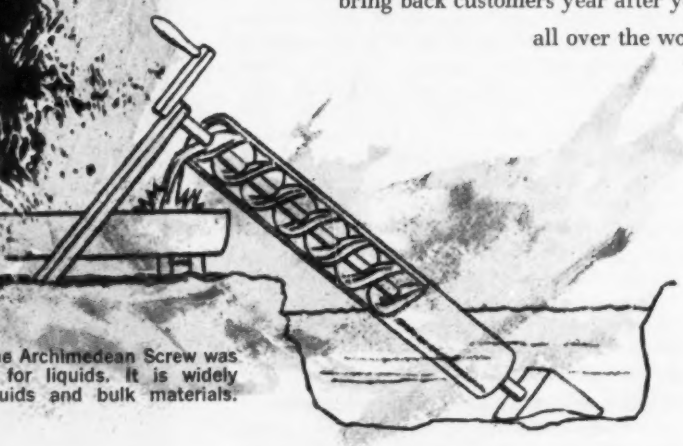
THE QUALITY OF THINKING

Archimedes, the ancient Greek philosopher, developed principles of mathematics and mechanics which unlocked secrets leading to the development of some of our most modern processes. His mind was at home in the farthest reaches of the abstract, at work in the closest confines of the practical.

At Brown & Root — whether it is one mind, or a group of minds — thinking knows no boundaries for inspiration. Problems in engineering and construction are solved in ways that consistently save our clients time and money. Brown & Root places a premium on the quality of thought, combined with thoroughly-seasoned knowledge and experience. The results bring back customers year after year, all over the world.



Over two thousand years ago, The Archimedean Screw was introduced as a lifting device for liquids. It is widely used today in moving both fluids and bulk materials.

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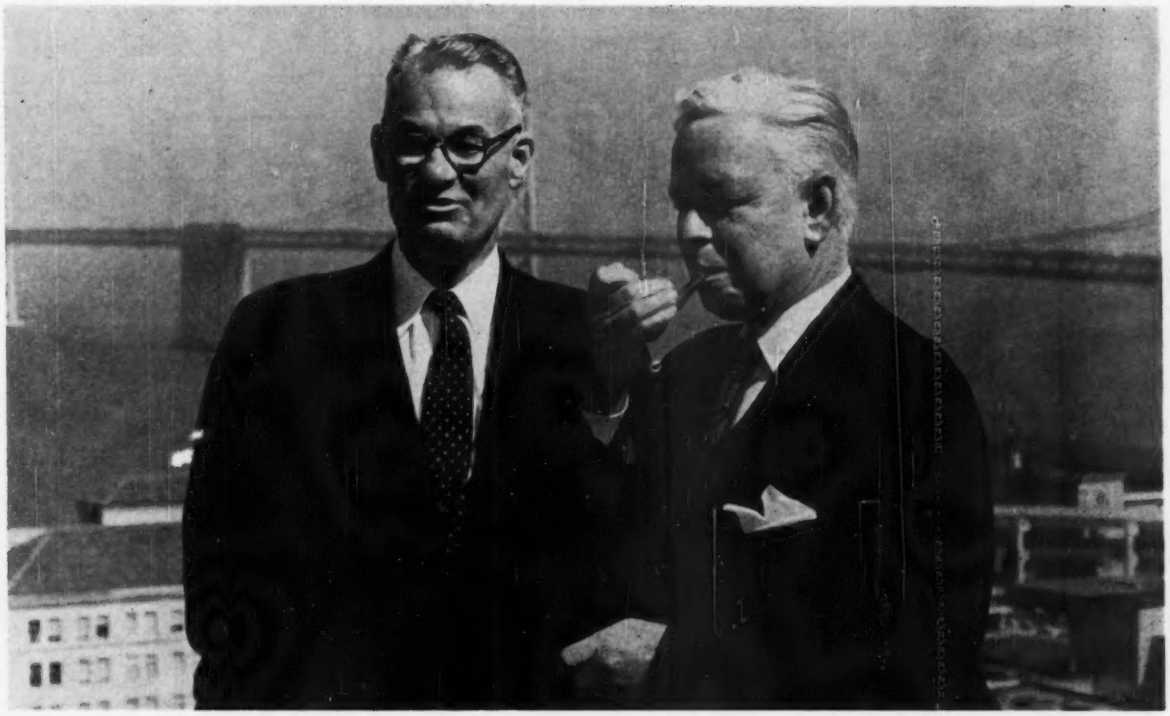


Socal's Powell, Parkhurst: On San Francisco Bay, they launch big new petrochemical company.

California Chemical on the Move

California Chemical (San Francisco) —up until last week only a name on Standard Oil of California's organization chart—has suddenly been endowed with flesh and blood. It's now a fully staffed operating company with sales volume running at $150 million/-year and growing at 15%/year. Budgeted for expansion: $20 million this year, $40 million in '61.

What Socal has done: it has merged its two chemical operating subsidiaries —Oronite Chemical and California Spray-Chemical — into California Chemical. Oronite now becomes the Oronite Division, and Calspray becomes the Ortho Division, of California Chemical. And Cal Chem—formerly only a holding company—now becomes an operating company with considerable autonomy within the Socal family.

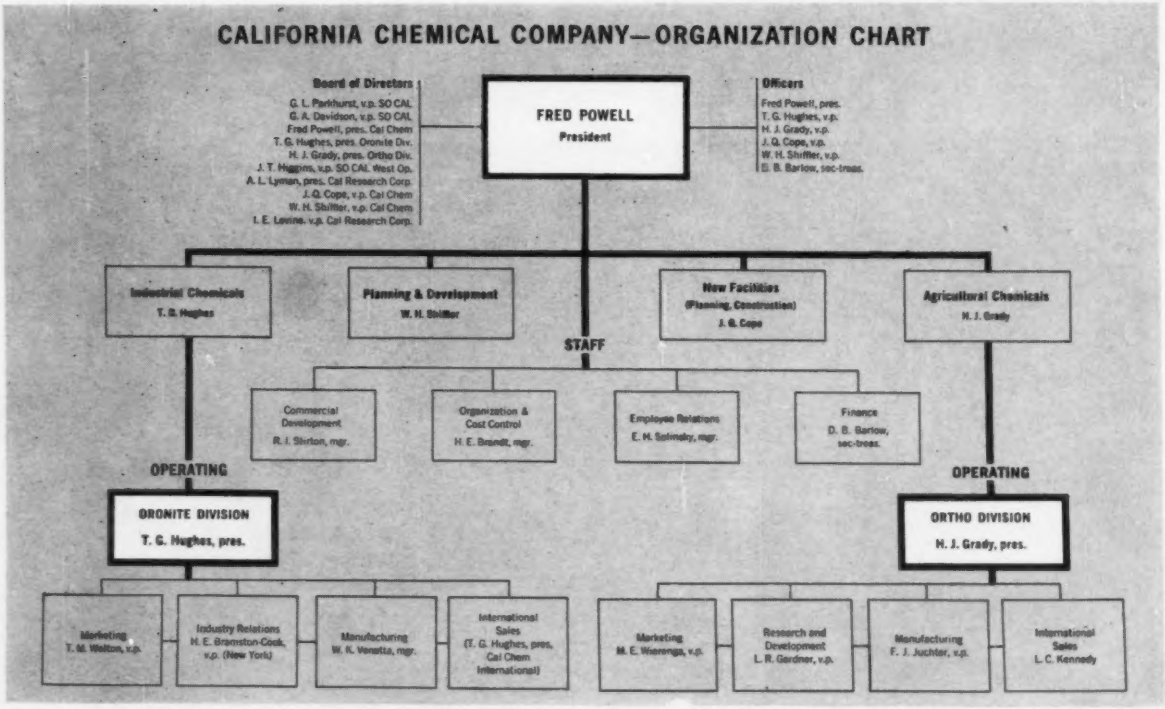
Possibly the biggest single factor behind the move: the desirability of further strategic diversification. Like most U.S. oil companies, big, globe-girdling Socal ('59 sales, $1.8 billion) has felt frustrated at present stifling conditions in the domestic oil and gasoline industry — petrochemicals have become increasingly attractive, compared with liquid fuels (*CW, May 21, p. 24*).

Revving Up on Chemicals: Now, Cal Chem's top officers revealed in an exclusive CHEMICAL WEEK interview, the parent company is putting more —and "much deserved"—emphasis on chemicals through a major reorganization and expansion of its chemical business.

The move was foreshadowed about a year ago when Fred Powell—a chemical engineer who, in his 35 years with Socal, has learned the fine points of both the petroleum and chemical industries—was switched from his post as chief of all Socal refineries and installed as president of Cal Chem (*CW, Sept. 5, '59, p. 30*). At that time, Socal said Powell's job would be to "pull together Socal's entire chemical interests" and to "improve the company's position in the chemical business."

What is gained through the organizational changes stemming from that move? Powell believes that the new organizational structure will enable the company to move ahead faster on new projects, make important decisions with greater efficiency and speed.

"The simplified structure," continues Powell, "concentrates the wealth of chemical experience and knowledge available in the Socal organization that will be most helpful to us as we carry out our accelerated program. However, despite the consolidation of corporate identities into new divisions, there will be no changes



in personnel or lines of communication in the operating divisions."

Open-End Growth Plan: In the new setup Powell—who reports to G. L. Parkhurst, a member of the Socal board of directors—will have considerable latitude for calling his own shots. Asked whether Cal Chem will integrate forward into plastics, paints and other end-products, or will stick rather closely to primary processing of refinery streams, Powell declared:

"No arbitrary limits have been placed on what we will do. Already many of Oronite's and Calspray's products are pretty far removed from what you would call upgrading or processing of refinery streams. We don't want to set limits on ourselves."

Powell and Parkhurst are open-minded on merger policies. "We have no idea at this time how much of our sales growth will come from acquisition and how much from internal growth," Powell told *CW*. He indicated that he has no particular merger scheme in mind at present.

Gearing for Aromatics: Right now, aromatics from petroleum would seem to be the principal area for new expansion. Among major projects now being considered:

- A $20-million complex to produce *p*-xylene and *o*-xylene on a site near Socal's refinery at Richmond, Calif. Later on, such a plant might be expanded for turning out ethyl benzene.
- Two new ventures overseas—also totaling about $20 million—to produce *p*-xylene, *o*-xylene, and ethyl benzene. Powell refuses to give further details now, but there's speculation that these plants—if built—would be the largest sources of xylene isomers in Europe.

Meanwhile, a number of projects are already under construction. Largest of these: the $22-million fertilizer plant being started for the Ortho Division at Fort Madison, Ia. Probable completion date: fall of '61.

Another recently launched project is a joint venture with Nippon Petrochemicals to build Japan's first detergent polymer and alkylate plant. It will go up near the Japanese company's oil refinery at Kawasaki, near Tokyo, on Japan's east coast. The multimillion-dollar plant — scheduled for completion late in '61—is expected to be able to supply Japan's entire detergent market.

Just a few months ago, Oronite started full-scale production of its Alkane 60 at a new plant in Richmond described as "the largest detergent polymer facility in the world" (*CW Market Newsletter, April 9*).

Several other projects, such as a

Cal Chem's Cope, Hughes, Grady, Powell aim at 15% growth rate.

boost in polybutene capacity and increased phthalic anhydride production, have been revealed in the past few months.

In addition, a new maleic anhydride plant is scheduled to come onstream at Richmond late this month.

Not Tied to the Coast: Commenting on the fact that the majority of Cal Chem's domestic plants are in California, Powell explained that detailed feasibility studies have shown that while most potential customers are in the East this is outweighed by other economic factors such as availability of raw materials and shipping facilities. Three of Socal's principal U.S. refineries are in California; others are in Utah, Texas and New Jersey.

"Our studies," says Powell, "have usually led us to place new construction in the West. In the future, if such studies favor another area, as they may well do on some projects, we will not hesitate to locate there to maintain our competitive position."

Going It Alone: While the two commercial development units have already been melded into a single high-level team (*organization chart, p. 38*), there are no plans to merge the research arms. Ortho will continue to support its own fully developed research program, which of course is highly specialized. Oronite will continue to rely on Socal's California Research subsidiary, which works on a contract basis for all other Socal affiliates.

Both the Oronite and Ortho divisions are aiming for sizable growth in their already important overseas business; but outlook is that they'll proceed along separate paths. Oronite intends to stick with its policy of operating abroad via joint ventures, while Ortho favors full ownership—or as much of a majority interest as local law permits.

Over-all, the main objective in building up Cal Chem is to diversify earnings. Says Parkhurst: "We feel we should continually broaden the investment base of Socal's earnings to prevent temporary, local or any other individual market condition from affecting our total profits. Financially, Socal will expect Cal Chem to stand on its own and make a percentage return on its investment at least equivalent to our oil operations. Our chemical companies have achieved this in the past."

New Pipeline Prices, Projects

Pipeline prices and projects were making news from western Canada to the Gulf Coast and from California to Washington, D.C., last week.

These developments—vitally affecting both cost and availability of natural gas and petroleum products for use as chemical feedstocks and fuels in many areas—included:

• Two rulings handed down in Washington by the U.S. Federal Power Commission. In one document, the commissioners gave their decision in the long-litigated Phillips Petroleum case—they approved the contract rates under which Phillips has been selling natural gas to pipeline companies, thus relieving Phillips of any liability to refund any part of price increases (in effect since '54) that have boosted the company's sales revenue on natural gas by $5.7 million/year to $51.2 million/year.

In the other paper, the commission laid down a policy for regulating natural gas rates charged by Phillips and all other "independent producers" on contract sales to interstate pipeline companies.

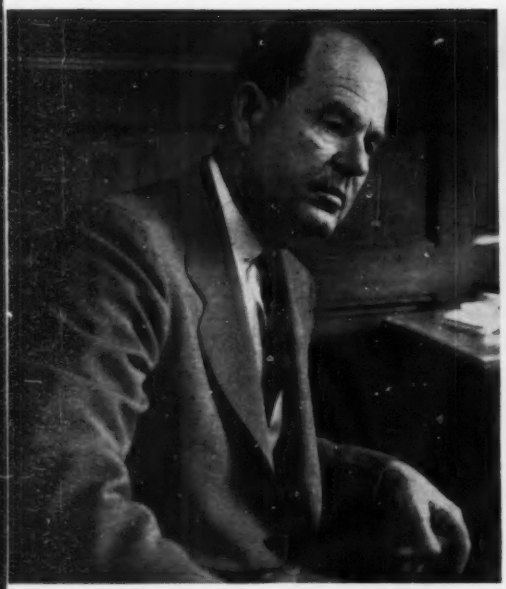
FPC says that such rates should be determined on a geographical basis, rather than on a cost-of-service formula (such as the formulas used to regulate the rates charged by pipeline companies and public utilities). But the commission expects this plan to be challenged; and lawyers estimate that court appeals might take two years or so to be decided. If the courts or Congress decide that costs must be used, regulation of producers would be practically impossible, FPC warns.

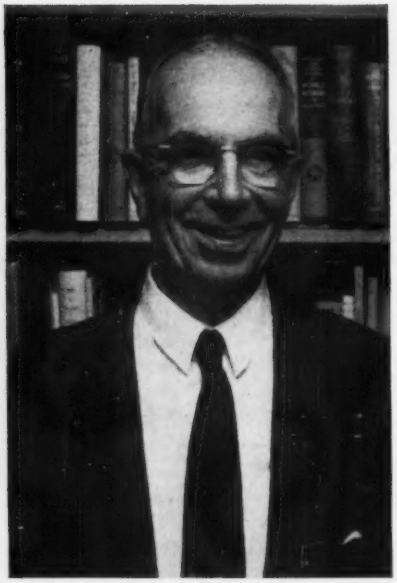
• A $63-million project to transport liquefied petroleum gas (LPG) through a 1,080-mile pipeline from near Houston, Tex., to Danville, Va. (*map, below*). This pipeline — which would make propane, butane and other LPG components available for fuel and processing use in many communities—is expected to be in operation by Nov. '61, with an initial capacity of 60,000 bbls./day. Operator will be Trans-Southern Pipeline Corp., a new and wholly owned subsidiary of Transcontinental Gas Pipe Line Corp. (Houston).

• A study by Texas Eastern Transmission Corp. (Houston) and Consolidation Coal Co. (Pittsburgh) on feasibility of a pipeline to transport coal from West Virginia to electric generating plants on the East Coast. This project could benefit CPI companies by making possible more economical power generation in various industrial communities and also by advancing the technology of pipeline transmission of solids in slurry form. Consolidation Coal is already operating a coal-slurry pipeline in Ohio.

• A new ruling by the Canadian government—concerning tax treatment of pipeline construction costs—that's expected to stimulate building of oil and gas pipelines in Canada.

New pipeline to pump Texas LPG into seven Southern states.





Texas Gulf's Stephens, Jefferson Lake's Walet, Freeport's Wight: They all vote for diversification.

Sulfur Makers Diversify for New Growth

Texas Gulf Sulphur Co.'s push to complete studies on its proposed $20-30-million potash project at Moab, Utah, is only one of a series of diversification moves being pondered by leading U.S. sulfur producers.

Only last week Trans-Jeff Chemical Corp.—joint venture of Jefferson Lake Sulphur Co. and Transcontinental Gas Pipe Line Corp.—started recovery of sulfur from the waste acid gas stream at Transcontinental's Tilden, Tex., gas treating plant. The new company—formed only last March—already is studying the feasibility of adding facilities to manufacture other, yet-unspecified, chemical products.

Diversification is particularly feasible for large sulfur companies because they usually have on hand enough capital to explore and develop other minerals. Texas Gulf President Claude Stephens points out that the $20-30 million that his company may invest in potash facilities at Moab (*CW, Aug. 20, p. 25*) would be internal funds (from retained earnings and amortization reserves) and no outside financing would be necessary.

Similarly, the sale of Freeport Sulphur's Lake Washington oil properties in '58 provided the company with more than $50 million in excess of normal working capital. "As a result of our substantial financial resources we are in a strong position to take advantage of any opportunities that arise," Freeport President Charles Wight explains. "Freeport is actively seeking new opportunities for diversification and growth." These pending and under-the-wraps studies include "exploration for mineral deposits, investigating applications for our mineral products, and studying possible acquisition of interest in existing companies in fields in which we have a community of interest."

Texas Gulf— at present involved only in sulfur, with some gas and oil interest—is eyeing lithium and potash. Says Stephens: "We would like to diversify but we want to stay in the area of mining because we feel that this is what we are best qualified to do." This adds lead, copper and zinc to the TGS list of minerals under evaluation. Earlier, TGS carried out exploration for mineral possibilities in Australia.

Texas Gulf has three more years to evaluate a possible plunge into the lithium business before expiration of its five-year option on several thousand acres in North Carolina. To date, the company has completed pilot-plant operations there. Next step: to establish a market (*CW Business Newsletter, Oct. 3, '59*).

Two other U.S. sulfur companies —Freeport and Duval Sulphur and Potash—are already connected with potash operations. In '55, Freeport combined forces with Consolidation Coal Co. to form the jointly owned National Potash Co., which began operating near Carlsbad, N.M., in '57. Duval also operates a potash plant in the Carlsbad vicinity, and is producing copper and molybdenum near Tucson, Ariz.

TGS, Freeport and Jefferson Lake have all found the oil and gas business profitable. Jefferson Lake produces petrochemicals through its Merichem Division (Houston, Tex.) and its 69%-owned Canadian subsidiary, and President Eugene Walet is now leading the company into the asbestos industry. Freeport—whose nickel and cobalt venture was taken over by the Castro regime in Cuba—wants to get back into the metals business "whenever possible."

Typical insider's view of the sulfur companies' diversification efforts is that of Duval President W. P. Morris, who regards the trend as "something on which to broaden our bases." He feels—as do other sulfur industry leaders—that whenever allied operations are commercially attractive, moving into those fields is "just part of a company's normal growth."

More Surge in Sales

Buoyant sales and earnings both are cited by a number of CPI companies, large and small, that make their quarterly financial reports on different schedules than those of most industry members.

Although the chemical industry as a whole failed to equal last year's first-half profits, W. R. Grace & Co. credits its chemical divisions for helping to make corporate earnings greater than in '59's January-through-June period. Chemical sales were more than 15% higher than in the first six months of '59, President J. Peter Grace told stockholders, and earnings showed an even more satisfactory rise. Company-wide sales were up 6%, to $250 million; net earnings were up 8.8%, to $7.9 million. The Polymer Chemicals Division sold nearly twice as much high-density polyethylene as in the first half of '59, and its loss was "greatly reduced."

Chemicals-oriented Cosden Petroleum—now 53%-owned by Grace—reports a 28% drop in net income for the three months ended July 31. But the company still expects 12-month earnings to equal last year's.

For the nine months ended Aug. 31, American-Marietta boosted sales by 14%, to $268.1 million, and raised earnings by 4.2%, to $17.95 million. Chairman Grover Hermann added that September deliveries of the company's products were continuing at August's high rate.

Southern Nitrogen says its first-half sales were up by 22%, to $7.1 million, and net income jumped by 30%, to $1.45 million. However, the net income figure included $267,000 in insurance recoveries relating to business interruptions in previous years.

Firestone Tire and Rubber set new records for the nine months ended July 31: sales up 4.3%, to $883.6 million; earnings up 3.2%, to $46.1 million. The company is budgeting $120 million for plant expansion and modernization.

Raychem Corp. (Redwood City, Calif.) more than doubled its sales volume in the fiscal year ended June 30, from $1.45 million to $3.6 million; but profits shrank from $204,000 in fiscal '59 to only $1,500. Reasons: start-up costs on new products, expansion outlays, and increased research and operating costs.

Eastman's Ford: For a marketing subsidiary, a sales specialist.

More Time for Sales

Henry L. Ford will be the new president of Eastman Chemical Products, Inc. (ECPI), succeeding L. K. Eilers, who has been moved up to vice-chairman, board of directors.

ECPI is the Eastman Kodak subsidiary responsible for marketing fibers, chemicals, and plastics produced by the Tennessee Eastman and Texas Eastman divisions. Eastman felt it should have a president who could devote more time to ECPI marketing problems and strategy than Eilers, who is also first vice-president of both the Tennessee and Texas companies.

Ford's background: largely in sales. He started with Tennessee Eastman in 1922, became manager of chemical sales there in '31, assistant vice-president in charge of chemical sales, purchasing, and traffic in '47. When ECPI was formed in '53 he was made vice-president for the chemicals division. Ford also is a lawyer, has been admitted to the Tennessee bar.

Living with Tariffs

Day-to-day tariff procedures, rather than the merits of various policies, will be the subject of the third annual seminar on tariff and customs matters, sponsored by the Synthetic Organic Chemical Manufacturers Assn.

The meeting will last all day Tuesday, Oct. 11, at the Hotel Delmonico in New York. Speakers will be high-ranking officials of federal agencies concerned with chemical tariffs.

Paper Boom Begins

Last week's decision by Canadian Forest Products (Vancouver, B.C.) to build a $50-million pulp and wood products mill — latest of more than half a dozen paper industry projects in the $10-60-million range launched so far this year—is further indication that next year's pulp and paper industry capital spending may top this year's estimated $750 million.

The anticipated rise in plant and equipment outlays reflects the industry's confidence in an increasing demand for pulp and paper throughout the world. In Montreal last week, President R. M. Fowler of the Canadian Pulp and Paper Assn. predicted that world demand for pulp and paper will double in the next 15 years. During 1960 and '61, total U.S. capacity is expected to climb by 1.7 million tons/year to 43.2 million. So far this year, U.S. paper companies have been operating at well more than 90% of capacity.

Canadian Forest Products' new mill will be built in northern Alberta. This switch from British Columbia—where the company had concentrated its operations in the past—was caused by lack of accessible timber on the British Columbia coast and public opposition to the tree farm license system. CFP, however, will continue to operate and expand its B.C. facilities, in which it has invested some $60-70 million since 1944.

And three more mergers have been negotiated:

Riegel Paper Corp. has proposed merger of Bloomer Bros. Co., Lassiter Corp., Fairtex Corp., and Branson Yarn Co. into Riegel. The four-way merger would add approximately $19 million to Riegel's annual sales volume.

In another deal, Mead Corp. (Dayton, O.) will purchase the assets of Gilbert Co. (Menasha, Wis.) for an undisclosed sum, subject to stockholder approval. Mead thus will extend its diversification to include rag content paper.

In a third transaction, Beveridge Paper Co. (Indianapolis) has purchased the land and buildings of Indianapolis Bleaching Co., which had been used by Bemis Bag Corp. (St. Louis). Beveridge will use the property for a converting operation in paper finishing and for warehouse space.

COMPANIES

Olin Oil & Gas Corp. (New Orleans) has listed its common shares on the New York Stock Exchange. The company—formerly owned by Olin Industries—has 2,829,628 common shares outstanding, held by about 3,800 stockholders.

•

Textron Inc. (Providence, R.I.)—which recently formed Textron Pharmaceuticals as a subsidiary to engage in the ethical and proprietary drug business—is entering the office copying and equipment field with the formation of Photek, Inc. The new subsidiary will introduce a line of office copying materials, in both wet and dry processes, soon after January.

•

Southern Nitrogen Co. (Savannah, Ga.), manufacturer of nitrogen fertilizer products, has acquired Millhaven Sales Corp., anhydrous ammonia distributor, in southeast Georgia, for $500,000. The purchase marks SN's entrance into retail selling of anhydrous ammonia and will double company sales of this product for direct application purposes.

•

Canadian Industries Ltd. (Montreal), basic plastics producer, has purchased R. D. Cattermole Ltd., pioneer in the development of polyethylene packaging films, and M&D Industries Ltd., the only extruder of polyethylene film in British Columbia. The acquisitions have been interpreted as a move by CIL into the polyethylene converting field.

•

C.F.C. Funding, Inc. (New York), has been formed as a publicly owned company for financing chemical companies and projects. Financing will be done through purchase and leaseback of machinery and equipment. Although a portion of the company's capital has already been assigned in purchase-leaseback operations, funds are available for further financing.

EXPANSION

Soda Ash: Stauffer Chemical Co. (New York) will begin construction early this month of its $20-million trona development 21 miles west of Green River, Wyo. *(CW Business Newsletter, July 23).* First buildings to go up will be a shop and warehouse. Depth of trona deposits: 800-1,000 ft.

•

Intermediate Chemicals: Archer-Daniels-Midland Co. (Minneapolis), a leading supplier of industrial and intermediate chemical products, broke ground last week for its estimated $15-million chemical center six miles south of Peoria, Ill. *(CW, May 28, p. 27).* The new plant—scheduled for operation by spring of '62—will manufacture nitrogen compounds, plasticizers and intermediate chemicals.

•

Anhydrous Ammonia: Solar Nitrogen Chemicals (Lima, O.), subsidiary of Atlas Powder and Standard Oil of Ohio, has started construction of its $15-million plant east of Joplin, Mo. *(CW Business Newsletter, April 30).* Scheduled for operation by April '61, it will produce anhydrous ammonia, urea and related products.

•

Polyethylene: Foster Grant Polyolefins, a Foster Grant (Leominster, Mass.) subsidiary, has decided on a Beaumont, Tex., location for its multimillion-dollar polyethylene plant *(CW, May 7, p. 23).* The Agfo process plant will have a capacity of 12 million lbs./year of polyethylene and will go onstream next summer.

•

Alkyd Resins: Reichhold Chemicals (White Plains, N.Y.) will double the productive capacity of its Jacksonville, Fla., operation through construction of a $500,000 plant. The addition will increase the plant's production of polyester and alkyd resins to 10 million lbs./year.

•

Solid-Propellant Engines: The Air Force has allocated $17 million to Thiokol Chemical (Trenton, N.J.) for expansion of its facility at Tremonton, Utah. The site will be used for production of the first-stage solid-propellant engine of the Minuteman ICBM.

FOREIGN

Nitrogen/Southern Rhodesia: A $25.2-million plant to produce nitrogen for both explosives and fertilizers will be built by African Explosives and Chemical Industries (Rhodesia) Ltd. The plant, which will be in Salisbury, is expected to be in full production by 1965.

•

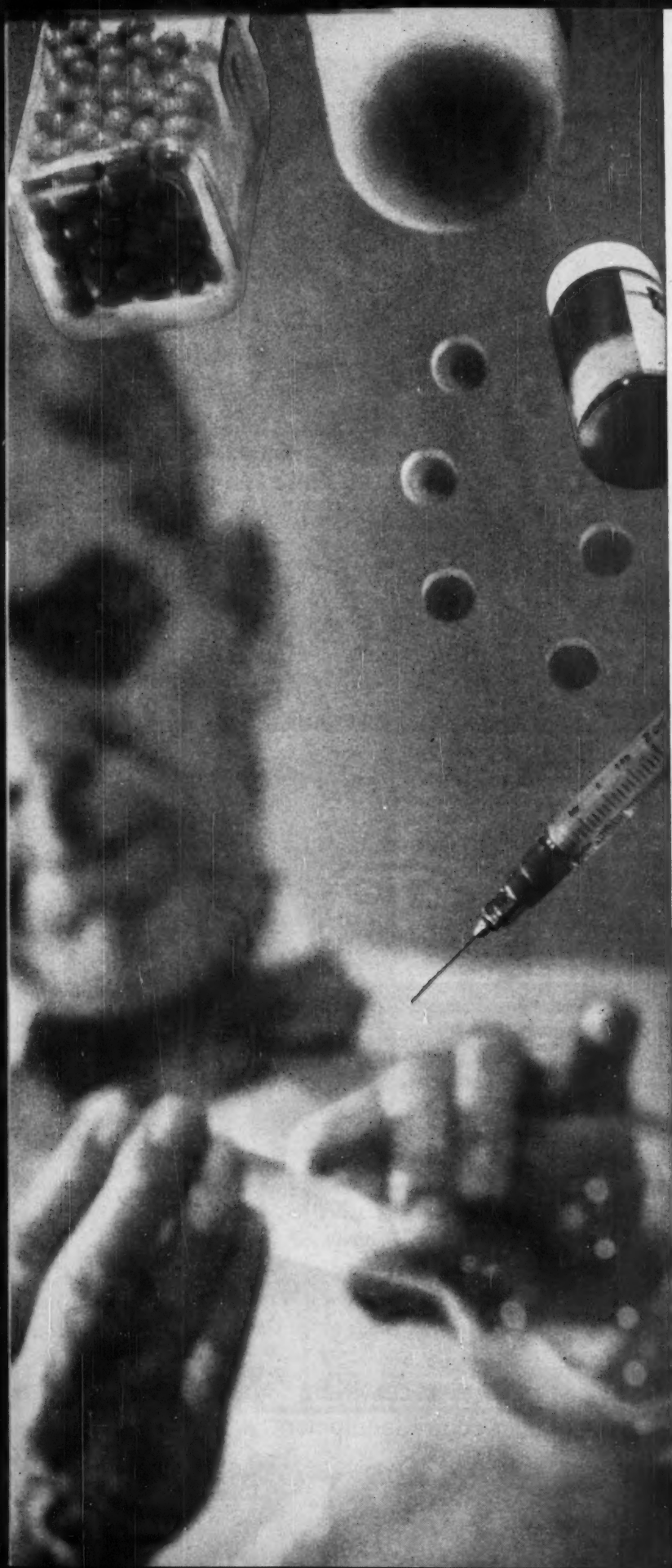
Petrochemicals/Spain: A $9-million petrochemicals plant will built by a Dow Chemical Spanish affiliate, Dow-Unquinesa S.A. (probable name for new joint subsidiary of Dow and Union Quimica del Norte de Espana S.A.) Initial capacity: ethylene, 21,000 tons/year; propylene, 8,000 tons/year; plus some output of C_4 hydrocarbons. The Spanish government has approved the project, after having turned down propositions from Esso and Shell for much larger projects *(CW, Sept. 24, p. 23).*

•

Aluminum/Australia: A $6.75-million addition to the Bell-Bay Aluminium Smeltery in Tasmania will raise the plant's annual capacity by 4,000 tons to 16,000 tons. Technical assistance will be provided by the Swiss firm Aluminium Industries AG. (Zurich). The new plant, which will include modern electric furnaces, will be finished in about three years.

•

Chemicals/Germany: Farbwerke Hoechst AG. (Bonn) reports sales were up $78.6 million in the first eight months of 1960, expects total '60 sales to reach $620 million, compared with $529 million last year.



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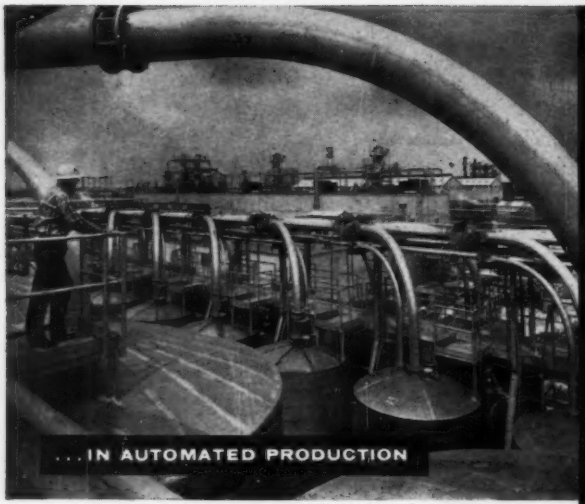

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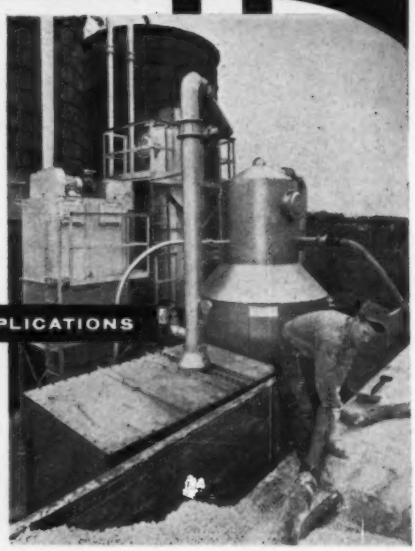

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FULLER COMPANY GENERAL

Washington
Newsletter

CHEMICAL WEEK
October 8, 1960

The Du Pont-GM stock dispute heads the Supreme Court's list of important cases it must settle in the new session, which has just begun. The court is expected to get around to this case in January or February.

In '54, the court refused to dismiss the Justice Dept.'s antitrust suit and asked a lower court to work out a plan to divest Du Pont of GM holdings. The lower court suggests that Du Pont keep its shares of GM, but with no right to vote them. Du Pont shareholders, however, would be granted voting rights for the company's GM shares. Judge Walter J. LaBuy believes this would remove the chemical company's influence on GM.

The Justice Dept. disagrees. It says nothing short of requiring Du Pont to sell its GM shares will end the tie-up between the two companies, which, the Supreme Court has already ruled, violates the Clayton Antitrust Act.

•

Compromise on who may carry freight in collapsible containers has been recommended by an ICC examiner. Chemical companies have an interest in the fight between general haulers and bulk haulers concerning use of big (1,000-3,000 gal.) rubber or plastic bags that can be filled with liquid or dry flowable commodities and loaded on either rail or truck flatbeds.

More than 200 trucking firms want authority to offer special rates, making use of the freight bags. Tank-truck operators and railroads fear this would seriously cut their business. Under ICC regulations carriers of general commodities are not supposed to handle bulk that requires special equipment, and the tank people insist that the collapsible tubes are special equipment.

The ICC examiner recommends that general carriers be allowed to carry the collapsible tanks in cases where the shipper fills them and the receiver empties them, with the trucking company merely picking up and delivering the bag. The shipper, and not the trucker, would have to own the bags. In cases where the commodities are loaded by hose or a similar device, only tank companies would be allowed to handle them.

•

CPI companies will fare better than expected in GATT negotiations. That's the word officials are spreading quietly to producers of coal-tar chemicals and nonferrous metals and minerals. They say tariff cuts offered on their products will be less severe than industry representatives have been anticipating.

For one reason, domestic protectionist pressures are going up again in Washington as election draws closer. On top of that, the U.S. is now less sure of getting Europe's trade blocs to reduce their external import duties the full 20% aimed for. U.S. strategy is still to make as much U.S. tariff concession as possible to encourage full-scale European

Washington Newsletter

(Continued)

cuts. But reports from Europe now are that the British-led European Free Trade Assn. ("Outer Seven") is dragging its heels in negotiations with the continental Common Market countries ("Inner Six") to join in a mutual 20% cut in the external rates of the two blocs.

If it looks at last as if the two blocs won't comply, there may be less pressure for the U.S. to make substantial tariff cuts.

The tariff commission and other government agencies, after two months of hearings, are now working on the final list. It won't be made public until negotiations begin in Geneva in January.

•

The Navy is "lobbying" with industry for support in its fight against military unification. The service fears unification means downgrading of the Navy in favor of Air Force. Their fears are heightened by both Republican and Democratic platforms, which call for defense reorganization. But they are especially afraid of Democratic intentions, because Sen. Stuart Symington, a Kennedy advisor on defense, and possible Pentagon chief if Kennedy wins, is strong for unification. And he is a former Air Force Secretary.

Navy top officers tell industry representatives in private conversation: unification would mean channeling of contracts to fewer companies. When each service buys chemicals, say, it may procure from 10 different companies. But if just one military agency handled all contracts, the number of suppliers would obviously be reduced.

•

The Du Pont Mylar polyester film on the next satellite Echo will be 10 times as thick as that on Echo I now circling the earth. Echo I has a film ½ mil thick covered with vapor-deposited aluminum.

Data collected from the passive communications satellite show that the sphere's skin can be made more rigid to give longer life.

Echo II may be larger than the 100-ft. diameter of Echo I, but it may not be placed as high in orbit as the 1,000-mile Echo I. The Echo series of satellites are first experiments leading to a passive satellite communications system. It will be another three to four years, however, before such a system is fully perfected, space experts say.

•

Soviet scientists have a plan to thaw the frozen north by creating a space belt of potassium particles to capture more solar heat. One big advantage would be to keep Russia's North Sea shipping routes open for year-round navigation.

The plan sounds "way out" but U.S. space scientists say it may be feasible. What the Soviets would do is put some 1.7 million tons of the particles in space 600 to 700 miles up. The reflecting belt would then cause more solar heat to be reflected to earth. Rockets would carry the particles into space, where they could be dispersed by a special centrifugal apparatus.

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1. Bromine, Dry—Br_2 Dark, reddish-brown, volatile liquid. Very reactive brominating agent and mild oxidizing agent in the manufacture of organic and inorganic bromides, intermediates, dyes, photo chemicals, pharmaceuticals, and perfumes. Moisture content of less than 30 ppm permits use in nickel and Monel equipment.

2. Hydrobromic Acid 48% and 62% — HBr Clear, colorless, or light amber fuming liquids. Used for the manufacture of inorganic metal bromides, aliphatic bromides, pharmaceuticals, dyes, and intermediates.

3. 1, 3-Dibromo-5, 5-dimethylhydantoin — $(CH_3)_2$ CN(Br)CON(Br)CO Fine, stable powder with a minimum active bromine content of 54%. An effective and economical reagent for controlled brominations of aromatic and unsaturated aliphatic compounds, especially in the allylic position.

4. Tetramethyl Ammonium Chlorodibromide— $(CH_3)_4$ $NClBr_2$ Orange crystalline solid (59.4% available bromine). An easily handled solid which yields elemental bromine.

5. Phosphorus Tribromide—PBr_3 Colorless or slightly yellowish clear liquid. Used in the preparation of organic bromides, especially for brominating alcohols without rearrangement. Also used as a catalyst and analytical reagent.

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SPECIAL REPORT

BLACK AFRICA

Africa Today: Revolution, Growth,

Only the incredible chaos in the Congo and the spectacular all-star performance in the United Nations during the past weeks could have suitably emphasized the historic revolution that is churning through Black Africa—that immense land of steamy jungles, ragged bush, and cool highlands that sprawls between the Sahara and the white man's bastion of South Africa.

It's a revolution fraught with political danger for the West. But businessmen are beginning to discover that it also bears the seeds of great new opportunities.

Although political independence can be won overnight, economic self-sufficiency takes much longer to achieve. On the whole, tropical Africa is about as underdeveloped as a territory can get, with only about 10% of the population estimated to be living within the money economy. A recent U.N. study shows per-capita income ranging from $30/year in Ethiopia to $194 in Ghana.

Moving Ahead: Yet, even though tropical Africa may be generations away from the point where it can generate its own industrial growth—it already has some impressive strides behind it. Since World War II, government and private investors have been pouring money into British and French Africa. Between '53 and '58, for example, private foreign investment in Nigeria alone increased fourfold, to $56 million.

Market for Chemicals: This is clear evidence that Africa is entering the modern economic world. But it is far from a picture of a mass consumer market or of an industrial engine that needs massive imports to keep it running.

Still, though it will be a long time before Black Africa becomes a major market for heavy industrial chemicals, many chemical companies have found it a market already well worth cultivating.

The area's demand for chemicals and chemical products, in fact, is growing second only to the demand for machinery and transport equipment. Between '51 and '57, tropical Africa's chemical imports rose from $80.1 million to $146.4 million.

Nigeria last year imported $28.3 million in chemicals and Ghana took $25.2 million worth. As might be expected, the biggest share for both countries was taken by drugs and pharmaceuticals—$7.6 million for Nigeria, $5.7 million for Ghana. The Belgian Congo alone imported $6.2 million worth of pharmaceuticals, while the Federation of Rhodesia and Nyasaland took $4.9 million.

Other chemical products are also finding growing markets. Ghana, for example, last year spent $4.6 million for soap and soap powders, and more than doubled imports of insecticides, fungicides, etc.—from $1.25 million in '58 to $3.7 million in '59. Paints and cosmetics are also important items in African imports.

More of Same: Market observers say these products are sure to continue growing strong, particularly in agricultural chemicals. Fertilizers, in fact, seem to be the big "sleeper" so far.

Figuring prominently in most every territory and new nation is the push for boosting agricultural yields. In West Africa, for example, agriculture is almost exclusively on peasant landholdings, and only in recent years have agricultural research and mass education systems been introduced to upgrade farming methods. The growth potential for fertilizers and agricultural chemicals is enormous.

With the building boom firmly under way, demand for more paint and structural materials is bound to soar along with agricultural chemicals. So will pharmaceuticals, disinfectants, etc., as public health programs develop. And the increasingly sophisticated consumer market will demand more toilet articles and cosmetics.

Right now, reports one major British chemical firm, it supplies chemicals to West Africa ranging from salt, drugs and crop protection chemicals to dyestuffs and plastics. It finds demand increasing for dyestuffs in Nigeria (keeping step, particularly in the North, with the local textile industry expansion), brisker demand throughout the area for the new synthetic fibers, small but rising purchases by the footwear industry in West Africa for rubber chemicals.

Other British producers are also enthusiastic about prospects in the African market. Imperial Chemical industries notes that of its total exports of about $103 million last year it sold $13 million worth to South and Central Africa and nearly $9 million worth to West Africa. And a Fisons spokesman, thinking of British Africa in general, says "We're only starting to scratch the surface."

On the Outside: But U.S. exporters haven't even gone that far. Of Nigeria's total chemical imports of $28.3 million last year, sales by the U.S. accounted for a meager $230,000. Of Ghana's $25.2 million in imports, only $259,000 came from the U.S.

There are a number of reasons for the failure of U.S. producers to dent the market of Black Africa. Until this year import restrictions against the dollar area helped bar the U.S. from competition. But these have largely been lifted. With the French African nations, the special arrangements they are working out with the European Common Market will present some problems for U.S. exporters.

More significant is the fact that the colonies and new nations have developed traditional trade ties with their European parents—and these are not easily broken.

The methods of local distribution make it especially hard for a U.S. firm to crack the market. Trade in British Africa has been dominated by a relatively few large import houses, who frequently handle a broad range of goods and who have established their own European supply lines—sometimes with their own parent companies or affiliates. Unilever's sprawling trading subsidiary, United Africa Co. Ltd., is a good example.

But this, too, becomes a less important factor as the

New Opportunities

colonies reach independence. Although most of the British and French colonies will continue to have close ties with their mother countries, they are anxious to broaden their trade relationships, in part on general business principles, partly to break the grip of exploitation by some of the giant trading companies.

The market, in fact, has become highly competitive. For some time, South African industrialists have been finding growing markets in Central and East Africa—although the boycott against South African goods has been taking its toll and may all but totally destroy South Africa's sales to the rest of the Continent.

German, Japanese and Israeli businessmen have been particularly aggressive in the tropical African market. In Ghana, for example, West Germany's share of the market rose from just under 6% to nearly 9% last year. In Nigeria, Germany has about 7% of the market, while Japan holds around 10%. Continental Western Europe sold Nigeria $5.2 million worth of chemicals last year. Almost half of this—$2.5 million—came from Western Germany.

One factor which hasn't helped U.S. exports to Africa is simply that it is so far away, compared to European suppliers. The expanded manufacturing activities of U.S. chemical producers abroad may help get around this. Pfizer's operations are good example. Over the past two years, Pfizer has set up small sales branches in Ghana, Nigeria, British East Africa, the Federation countries and Angola.

It already had sales offices in South Africa and Belgian Congo. Sales are mostly broad-spectrum antibiotics, and some vitamins and hormones. Almost all of this is supplied from the company's European production.

Another factor that is at least as important as those above in explaining the U.S. lag in the African market is lack of knowledge of the opportunities that exist there. To a degree, its simply a hangover of the insularity and provincialism that characterized much U.S. business thinking until the last few years' almost frantic rush for overseas investment.

But there's evidence that these attitudes are changing. More and more U.S. businessmen are seen poking around the capitals of Africa, sizing up the strange territory. U.S. Commerce Dept. officials and businessmen accompanying them have returned from trade missions to Africa brimming with enthusiasm over the market possibilities. Later this month, John Hopkins University will sponsor a conference for business men on Africa, and a similar conference on African resources is slated for the spring, after long delay.

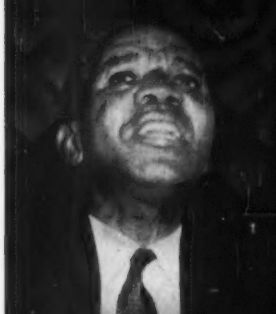
Room for Investments: U.S. reticence about venturing into Black Africa shows up in the investment record, too. Of the $27 billion in direct investments ploughed overseas by U.S. private interests by the end of '58, only $314 million had gone into tropical Africa. And most of this

Key Names in Changing Africa

Alhaji Abubakar Tafawa Balewa, London University Graduate, is Nigeria's first Prime Minister. His country moves with relative calm into independence, in the midst of Africa's turmoil. Experts rate Nigeria—most populous country in Africa and one of the most stable—as a top investment prospect.

Julius Nyerere will be Prime Minister when Tanganyika finally wins independence. A moderate, Nyerere is one of the most respected African leaders. His country, caught up in the racial tensions of East Africa, is among British Africa's least developed. He seeks U.S. investors to help build it up.

Gwame Nkrumah, self-styled "deliverer" of Ghana, aspires to head a Pan-African neutralist bloc. Leading the first British African nation to independence, Nkrumah shelved democracy, cracked down on tribalism, made Ghana one of the most stable and fastest-growing nations in Africa. He too seeks U.S. investment.



Hastings Banda, rabble-rousing former London physician and now head of the Nyasaland African National Congress, leads his people in the violent struggle against white domination, which will likely break up the Rhodesian Federation, possibly isolating Southern Rhodesia from the rest of Black Africa.

WIDE WORLD

Sekou, Toure, Guinea's Marxist-trained strong man, broke away from the French Community two years ago, has led his country into the shadow of the Communist bloc. He triggered the tidal wave of independence that has swept through the Community, transforming it into a group with little cohesion.

UPI

went into iron ore projects and rubber plantations in Liberia.

Of course, Black Africa's still primitive economy doesn't offer boundless investment opportunities to the chemical industry. Yet a surprising amount of local production is springing up, and the big British producers are getting in on it. Take ICI's insecticide plant in Ghana. And through its joint subsidiary with De Beers, African Explosives and Chemical Industries Ltd., ICI is involved in production of a wide range of chemicals—especially acids, fertilizers, and explosives—in Rhodesia and East Africa. Fisons also makes fertilizers in Rhodesia. And Unilever's United Africa Co., in addition to expanding its already huge trading operations in many areas, has been branching out into manufacturing for the first time.

In the Rhodesian Federation, there are about two dozen companies producing carbon dioxide gas, industrial alcohol, methylated spirits, fertilizers, acids, cattle dips, pharmaceuticals, toiletries and cosmetics, paints, soaps, patent medicines, insecticides, disinfectants, wood preservatives, auto chemicals, industrial and medical gases, etc.

In the Congo (Belgian), there are more than a dozen chemical establishments, mostly in Katanga Province, producing a variety of chemical and pharmaceutical products, such as explosives, wood protecting chemicals, insecticides, sulfates, calcium carbide, sodium silicate, etc.

Kenya has more than a dozen companies, turning out agricultural disinfectants and chemicals, liquid and solid carbon dioxide, insecticides, soap, oxygen, acetylene, nitrogen, paints and varnishes, sodium silicate, polishes, cellulose lacquers, soda phosphate fertilizers.

In Ghana, the range is more limited—around 10 firms, producing powder and cosmetics, insecticides, pharmaceuticals, oxygen and acetylene.

Nigeria's chemical industry is even less developed. Eight producers make soap, perfumes and face powders, carbon dioxide and dry ice.

With its enormous market and its solid growth prospects, Nigeria will probably attract more chemical investment.

Much of the industry will probably be based on local raw materials, as the soap industry is. Nigeria is the world's largest exporter of palm oil. And it consumes about 50,000 tons/year of soap. So a domestic soap industry is almost inevitable.

Lever Brothers built the first plant in '23. Since then, it built a second plant, and several other producers also started operating. Now, some Nigerian soap is exported to neighboring companies.

Eventually, coal may become an important chemical raw material for Nigeria—the only producer in West Africa. Nigeria is rich in coal, but it's a medium-quality, noncoking grade, which limits its industrial uses, although it's suitable for boilers and furnaces. Already Nigeria mines enough for its own needs and for export—74,561 tons were shipped out last year.

Carbonization tests have revealed a high yield of tars and oils, prompting studies on the feasibility of using it for plastics and chemical production. So far, no actual plans for production have been reported.

Big Picture: Africa's chemical activity must be viewed against the broad economic picture.

You can see the signs of the economic awakening all over Africa: new highways slicing through jungle and bush, new housing projects wiping away thatched-hut slums; sleek new office buildings; deep water ports to replace or at least supplement primitive surf ports. Scores of factories are going up. Industrial parks are being cleared for them, and vast dams erected to power them.

Take the Rhodesian Federation, admittedly well placed to attract business, with its big European population and rich mineral resources. Most of its industry has centered in Southern Rhodesia. In '46, there were 435 manufacturing establishments in Southern Rhodesia. By '53, there were 714. Today, in the whole Federation, there are more than 1,000, employing well over 100,000 people, chiefly in cement, metal products, tobacco, alcohol and soft drinks, motor vehicles repair, food preparations, transport equipment, apparel and footwear, printing and publishing, textiles.

As is usual in developing countries, cement plants appeared early on the scene. After the war, as construction started to boom, the Federation was a net importer of cement. Today its capacity is over 900,000 tons/year—easily enough to meet home requirements.

Recent projects in the Federation have included a $56,000 Colgate-Palmolive toiletry and tooth paste, a proposed $840,000 plant for the metal box company of Central Africa Ltd., a $4.2 million Ford of Canada assembly plant, and a $5.6 million Dunlop Rubber Co. tire factory.

Ghana's Goals: In leftish Ghana, the industrial emphasis is far more on state supervision and control, with broad lines of development laid down in the government's second five year plan, which was launched in '59.

The program is ambitious. Against easily realizeable government reserves of some $252 million, the plan envisages an outlay approaching $700 million on general development and another $280 million on hydroelectric works. About $350 million is to be spent on projects for "immediate implementation," ranging from construction work at Tema for the new town and deep water harbor (to relieve the surf-port bottleneck at Accra), to road and rail construction and education. Six hundred new factories, producing 100 different products, are to be built by 1964.

At the core of Ghana's development plans is the giant Volta River power dam scheme, which would ultimately generate more than 1 million kilowatts, would cost some $316 million. The project has been mulled over since 1924, but only recently moved close to reality when Ghana's head man, Gwame Nkrumah, persuaded the World Bank, the U.S. and Britain to put up half of the $168 million initial cost, once Ghana reaches an agreement on constructing an 120,000 ton aluminum smelter with the International Aluminum Consortium, set up by the project planner, Kaiser Industries.

At first, bauxite for the project will come from neighboring Ivory Coast, but eventually Nkrumah hopes to develop Ghana's own high grade reserves, and to boost the smelter's capacity to 220,000 tons.

Ultimately, Volta power could form the basis of a whole complex of profitable industries—at least 32, Kaiser believes. Iron ore from nearby Liberia could feed an elecetro-smelter. Steel production (Ghana produces manganese) could follow. And paint, insecticide, and cement plants could find markets.

Meanwhile, while these grandiose plans are worked out, Ghana is making some progress promoting other industrial enterprises, though it will take a sharp increase to reach the goals envisioned in the five year plan.

Since 1957, new plants have started to produce towels, matches, aluminum sheets, insecticides.

The insecticide plant—the first in West Africa, is an Imperial Chemical Industries venture. It opened about a year ago with a capacity of 500,000 gals./year.

Also in '59, Canada's Aluminium Ltd. set up two West African companies—Ghana Aluminium Products Ltd. (40%-owned by the Ghana government) and Nigeria Aluminium Products Ltd.

The new Ghana subsidiary put up a corrugated aluminum sheet plant at Tema, and now plans a $2.8-million rolling mill to "eliminate" the need for importing many semi-fabricated aluminum products into the country.

Push in Nigeria: With its population of some 35,000, most U.S. experts agree Nigeria is the most promising country in Black Africa for foreign investors. It's also having some success in starting light industries, although its most important gains so far have been in developing its "infrastructure"—the foundation of communications, utilities, and institutions that is the prerequisite of industrialization.

Since the war, two cement plants, two big breweries, three cigarette plants, soap factories, meat and fruit canning plants have been set up.

And, in what is probably the biggest manufacturing venture so far, a consortium of U.S. and European firms is studying prospects for building a $7.2-million glass products plant in Eastern Nigeria.

Although Nigeria hasn't drawn up any plans to match the scope of its much smaller neighbor's Volta scheme, it does have an asset which is nourishing some high hopes—oil. Production from the Shell and British Petroleum subsidiary's three fields in the Eastern Region ran about 16,000 bbls./day last year, is expected to be considerably more this year (although output is already falling at Oloibiri, where the first discovery was made in '57). If production plans pan out, a refinery may be built at Port Harcourt.

Patchwork Pattern: Elsewhere in topical Africa, much the same pattern prevails—the expansion of the traditional extractive industries where there are minerals, the gradual development of light industries to serve the growing urban areas, and here and there a major project promising faster development to come.

In Guinea, for example, there's the big FRIA bauxite and alumina project, a $175-million joint venture of Olin Mathieson and European firms. That started up last April.

In Kenya,—where, despite the paucity of mineral resources, manufacturing accounts for 14% of net domestic

Black Africa's Major Markets

Nigeria's Principal Chemical Imports — 1959

Chemicals and related products	$28,313,000
Caustic soda	550,533
Calcium carbide	248,259
Aliphatic and organic acids, etc.	186,071
Coal-tar dyestuffs, natural indigo, etc.	1,002,304
Washing blue	439,527
Prepared paints, enamels, etc.	2,739,102
Penicillin, streptomycin, etc.	1,371,625
Ointments, liniments	1,547,672
Essential oils, perfumes, etc.	680,604
Talcum and dusting powders	373,906
Toilet soap, including medicated soap	648,012
Common washing soap and soap powders	547,316
Soapless detergents, etc.	149,234
Waxes, polishes, pastes, etc.	790,423
Fertilizers	846,092
Gunpowder	227,357
Blasting explosives, other than gunpowder	265,902
Fuses, primers, detonators, caps	262,226
Pyrotechnical articles	176,016
Synthetic plastic materials	220,097
Disinfectants	427,946
Insecticides, fungicides, etc.	1,632,229

Chemical Imports of Ghana and Rhodesian Federation — 1959

	Ghana	Federation
Synthetic fibers	—	$1,835,000
Fertilizers, crude	$33,000	—
Inorganic chemicals	1,073,000	5,590,000
Organic chemicals	90,000	—
Tar or coal chemicals	93,000	57,000
Coal-tar dyes, etc.	80,000	286,000
Dyes, tanning extracts	7,000	64,000
Paints, etc.	2,198,000	2,661,000
Drugs	5,725,000	4,891,000
Essential oils	286,000	109,000
Soap, cosmetics	8,269,000	4,874,000
Manufactured fertilizers	49,000	4,171,000
Explosives	2,492,000	7,138,000

Chemical Imports of Belgian Congo — 1959

Inorganic chemical products	$3,284,992
Organic chemical products	1,057,269
Pharmaceuticals	6,216,646
Chemical fertilizers	957,909
Dyes, tanning extracts	2,007,368
Essences and perfume products	589,567
Soaps, lye, fats	2,173,185
Explosives	2,657,290
Photographic products	1,016,287
Industrial chemicals	3,750,588
Fabricated artificial plastic materials	2,185,810
Rubber and rubber products	7,931,179
Synthetic textiles, discontinuous	6,306,455
Synthetic textiles, continuous	760,991

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output compared with 8.5% in '47—Shell-BP and the government have reached agreement on a refinery at Mombasa Port which is slated to be in operation by '62. It will be, in the words of one Colonial Office official, one of "the biggest things" that has happened to the economy.

And Kenya Rayon Mills was set up last spring to build a $700,000 rayon plant, which will employ more than 500 people and—with tariff protection—cut off imports from Japan.

In Liberia, second oldest of the Black African states (after Ethiopia), Goodyear is investing in a 10,000-acre rubber plantation, and U.S. interests are active in two iron ore projects which will boost the country's exports from 2.5 million to 15 million tons/year.

In Libya, new petroleum discoveries have triggered a spurt of economic activity in what had been a relatively dormant economy.

Spur of Freedom: In the eyes of strong nationalists, political freedom is the key to economic progress, allowing a nation to use its resources to its own best advantage. To some extent, this is undoubtedly true. But the leap to freedom can also bring its problems.

If Black Africa is to achieve the industrial and economic advance it is striving for, it will need enormous new injections of two crucial ingredients—trained manpower and money. Independence can present a bar to both of these.

For one thing, once it has cut the natal cord, a new nation has no guarantee that it will continue receiving aid. And the funds poured into the African territories since the war by the European parent countries have been substantial.

Last year alone, France poured some $400 million into the French Community members of West and Equatorial Africa. Britain put some $75 million into its African territories, and Belgium's assistance to the Congo amounted to some $25 million. Between 1946 and last March, U.K. grants and loans to British Africa for communications, education, research, and medical schemes amounted to some $400 million. And money through the Colonial Development Corp., a development bank, financed schemes ranging from the $28-million pulp mill now abuilding in Swaziland, to a margarine plant in Kenya. (These figures don't tell the whole story, of course. Retrenchment by private companies has caused net disinvestment in some colonies).

Although some assistance will continue, most of this aid will be cut off. Moreover, severing the tie with the colonial parent means losing its credit backing. A new country has to prove its stability before it can expect to float substantial bond issues or win major loans from the international lending agencies.

But as long as the tenuous ties of the French Community hold together, its newly independent members will probably get some aid from France. Belgium will probably honor its aid pledge to the Congo for this year if political stability can be reestablished. The European Common Market has launched a $500-million "Eurafrica" development program for Africa and the Commonwealth plans an aid program. Moreover, the U.S., whose aid to Africa has been practically inconsequential in the light of the Continent's needs, has finally been jolted by the Congo crises into an awareness of the urgent need for action. Congress has just voted $100-million in emergency aid to Africa, and bigger appropriations will probably follow, no matter which party wins the election.

But, respectable though it is, none of this projected aid will come close to filling Africa's capital needs.

Equally grave is the lack of trained manpower, exacerbated by the instability stirred up by the whirlwind independence movement. Many white men have left the colonies, even the "stable" ones like Nigeria, and attracting replacements has grown steadily more expensive. Take Tanganyika, which has just started internal self-government and is moving with relative calm towards independence from Britain. Despite the fact that Tanganyika's political leader, Jules Nyerere, is universally respected as a moderate, capable leader and a friend of the West, the uncertainty hanging in the air over East Africa has made it difficult to recruit the trained British personnel urgently needed to help run the country—even though Britain has increased the financial inducements for working in its territories.

Open Doors: Because they are very conscious of these critical shortages of capital and skilled manpower, many of the new African leaders are ardently courting foreign investors.

This gives venturesome U.S. companies a chance to move into an area that has to some extent been roped off by the colonial privileges enjoyed by companies from the parent countries. In fact, these big companies themselves would now like to see U.S. capital move in. They realize it is necessary for the economic growth which will benefit their own business. Moreover, they like the idea of spreading the risk, and of avoiding the stigma of financial domination.

Attitudes of tropical African governments towards private foreign investment range all the way from the complete open door welcome of President Tubman's government in Liberia, to the Guinea regime's lowering suspicion.

In British Africa the welcome mat is especially prominent. Both Nigeria and Ghana have set up offices in the U.S. to attract investors. Like most of the "emerging" nations, the British African countries tend to favor local participation in new ventures, but they rarely insist that they be run by the government. "Pioneer industry" status, tax holidays, free repatriation of profits, expropriation guarantees—these are the kind of inducements being dangled before foreign investors.

Cause for Pause: But before foreign investors snap at this bait, they will take a long, sober look at the prospects for reasonable stability.

The explosion in the Congo has probably shaken the confidence of a lot of prospective investors in Black Africa. Actually, it would be unfair to generalize on the basis of the Congo disaster. Belgium tossed the Congo

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SPECIAL REPORT

BLACK AFRICA

to the wolves of independence without any preparation, after having pursued a native policy that denied a college education to all but a handful of Congolese, and that gave them no experience in higher government administration or in developing a political system or even a sense of national identity. Portugal, of course has been far more oppressive—so much so that the idea of independence isn't even a realistic issue in its two colonies.

In contrast to the Belgians' policy, Britain and France have prepared their territories for nationhood by offering experience in government, by nurturing the beginnings of true political life, by developing strong, moderate leaders like Nyerere, and Alhaji Balewa, Nigerias' Prime Minister, and Felix Houphouet-Boigny, the Ivory Coast's and West Africa's most noted political figure.

Still, the Congo's anguish should not be ignored. For it reflects in giant size many of the same problems that are bound to crop up with varying severity throughout the rest of Black Africa as it races towards independence. The rampant "nationalism" which erupted in riots in the Congo and frightened Belgium into trying to heave out the whole problem rears up elsewhere in Africa. The irresponsible demogogary of Patrice Lumumba, made possible by the low level of mass education, is also a threat in other emerging states. So are the personal rivalries between leaders of factions or regions, the instability of borders arbitrarily imposed by colonial masters, the bitter reaction to racial suppression, the tribal conflicts that slashed a bloody background to Congo's political struggle. And there is the ever-living threat of Communist plotters, waiting to seize their chance in the hour of turmoil.

Walking the Tightrope: Africa is in a race against time. The critical problem facing the European colonial powers is how to stall off independence of the various nations until these devisive forces that roil within them can be balanced off in some sort of structure of stability, while not waiting so long that the pressure of nationalism explodes.

The fever of nationalism—and some of its consequences—is nowhere better illustrated than in French Africa. Less than three years ago, France, with its population of 45 million, held tight control over the 40 million Africans who live in the 14 countries which cover an area larger than Western Europe. By the end of this year, they will all be independent. Paris didn't plan it this way. Neither did most of the African leaders.

The break came in November, '58, when France and all of its overseas territories voted on the constitution establishing Charles de Gaulle's Fifth Republic. "Yes" meant inclusion in De Gaulle's new French Community, in which the territories would assume considerable local autonomy, but France would remain the boss in matters like foreign affairs and defense. "No" meant immediate independence from France.

Only Guinea voted No. De Gaulle, in what seemed a flash of prideful vengence, immediately severed all ties with Guinea. The French civil servants who staffed most of Guinea's government went home, taking everything with them—even their files and lawbooks. As the Guineans tell it, the French even cut the phone lines.

If Guinea's head man, Marxist-trained Sekou Toure, already leaned towards the East, De Gaulle pushed him closer. The Communists were quick to pour in technicians to replace the departed Frenchmen, to grant loans, to sign trade agreements. On the eve of Guinea's independence, the French Zone took 75% of Guinea's exports, supplied 77% of its imports. Within 18 months, the majority of Guinea's trade had shifted to the Communist bloc.

Most other French African leaders have little taste for the Soviet bloc, or Toure's game of trying to play off East against West. But they haven't been able to resist the internal nationalistic pressures set in motion by Toure's break with Paris, and by the independence movement in British Africa. The result has been the complete evolution of De Gaulle's Community concept into a loose association of independent republics—somewhat like the British Common-

wealth and practically meaningless politically.

This has left French Africa an unstable region—unable to resist the forces that could lead to chaos. The break-up of the Mali Federation is a good example of this instability.

The leaders of both members of the union—Senegal's Leopold Sedar Senghor and Sudan's Modibo Keita—both supported the idea of federation. But both wanted to head it. When the Federation's independence removed De Gaulle's power to mediate, an open power clash broke out, and the Federation split up. Sudan has renamed itself the Republic of Mali. Last week, in accepting his new seat in the U.N., Mali's Premier, Mamadou Aw, brushed off the fact that France had sponsored his country's membership, and implied that France had a hand in the Federation's break-up.

Mali needs an outlet to the sea. To get it, there's a chance that it will hook up with Guinea—striking another blow to the cohesion of the French Community.

Regionalism and personal ambitions are also stirring up serious trouble in Britain's Uganda, where, as in the Congo, the ideal of centralism has run head-on with powerful leaders' vested interest in the status quo. Buganda, one of Uganda's four provinces, has over 25% of its population and much of its wealth. Britain wants to lead Uganda towards independence as a centrally governed unit. Buganda's hereditary ruler, the Kabaka, backed by several other local rulers in Uganda, opposes the union, fearing a loss of personal power.

Fatal Forces: The most dangerous threat to Black Africa's future are the explosive forces of primitive tribalism and racial conflict.

Tribalism may cause trouble almost anywhere. For Ghana, which was nearly wrecked by tribalism just as it was gaining independence, the solution was the authoritarian, father-image rule of Nkrumah.

Nigeria, which encompasses four main tribal groups and some 250 minor ones, seems likely to solve the problem without sacrificing parlimentary government, thanks to Britain's farsighted policy of grafting tribal power lines into the tissue of the government itself by making the tribes the foundation of strong political parties, and by giving the three regional governments autonomy.

Nevertheless, while the citizens of Nigeria's sophisticated cities primped themselves for last week's Independence Day celebrations, bloody tribal barbarism flared up in the Northern region, some 3,500 warring tribesmen were arrested, and technicians from the south fled for their lives.

Ghana and Nigeria may prove that stable Black African governments are possible, even with acute tribal divisions. But where the presence of large non-African elements multiplies the divisions, the odds are not so high.

This is the situation in East Africa—in Kenya, and, to a lesser extent, in Tanganyika. In Kenya, there's a basic division between the big and more advanced Kikuyu and Luo tribes—uneasily united through their backing of Tom Mboya's rather extreme Kenya African National Union—and the smaller tribes which are grouped behind the weaker Kenya African Democratic Union. Britain wants to take time to develop a competent local civil service and real parliamentary government before granting Kenya full independence. But pressure is mounting, and chances for this are shaky.

At worst, Kenya could explode like the Congo. Or it could end up with a K.A.N.U.-led authoritarian government, with the large minority of Europeans and Asians as a convenient scapegoat.

Meanwhile, these minorities are pressing for assurance against a black dictatorship, which delays independence and increases racial antagonism. There's a real chance that if Kenya wins independence too soon, a flight of white capital and brains will drain its economic strength.

In the Rhodesian Federation, the deepening threat of racial strife has already slowed the flow of investment. Under Federation Prime Minister Roy Welensky, the whites dominate the political scene. Nyasaland nationalists, headed by fiery Dr. Hastings Banda, demand that they be given the right

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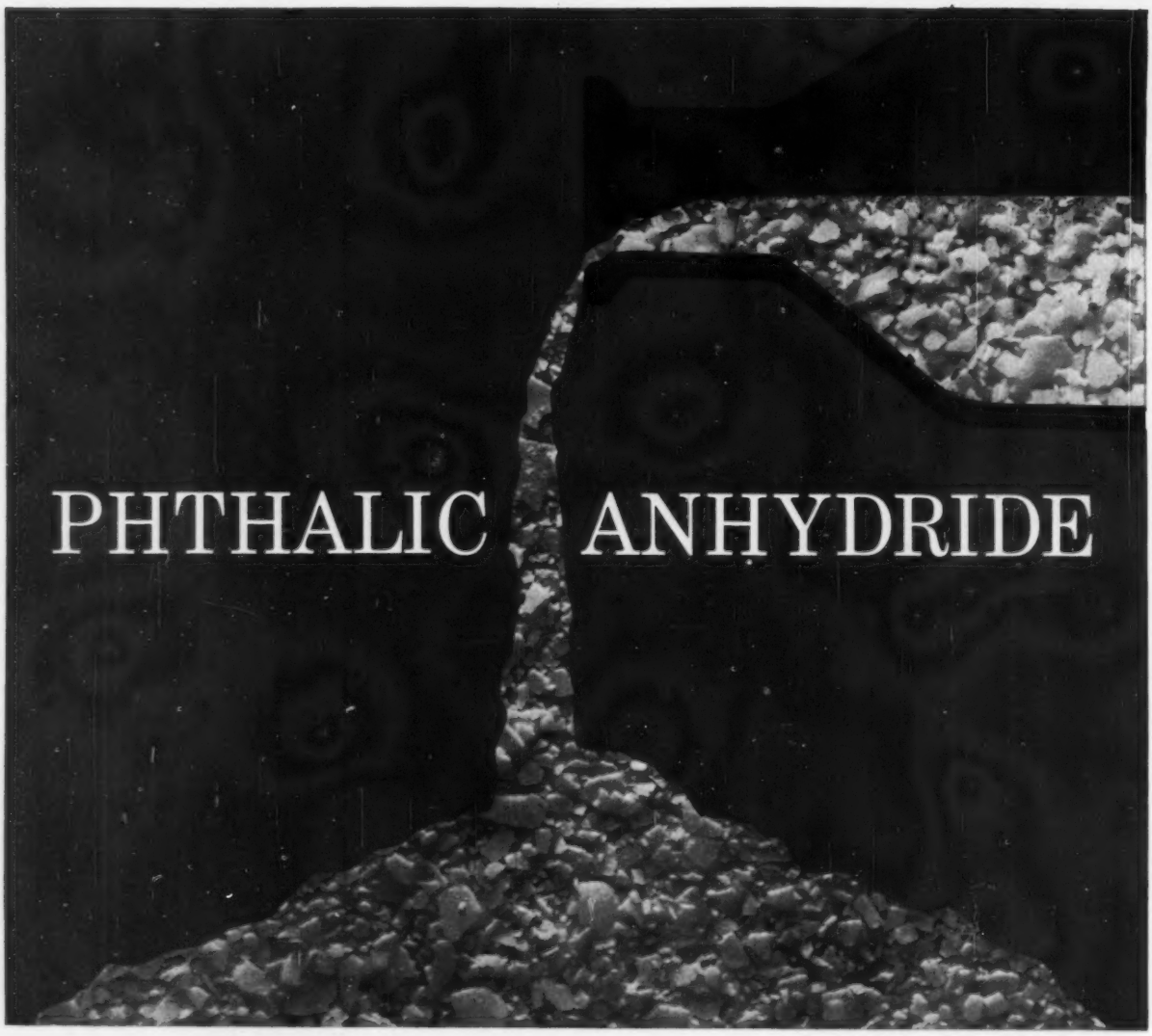

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BLACK AFRICA

Africa's Landscape: Progress and Poverty

Africa's natural resources and economic wealth are spread unevenly over the continent. East and Central Africa are on the whole better developed than West Africa for a number of reasons. Central Africa has an abundance of mineral resources which have drawn in large amounts of capital for development, and spawned a layer of secondary industries to supply the growing consumer population. West Africa, though not quite as richly endowed, has enough minerals to attract investment and help bolster the predominently agricultural economies, while its steamy climate kept white settlers to a minimum, reducing friction, spurring native education, developing the kind of stable political climate that capitalists will risk their money in.

East Africa, by contrast, has a paucity of minerals, but its rich agricultural potential attracted large numbers of white settlers who entrenched themselves in much of the best land, setting the stage for racial clashes that may cause trouble for a long time to come.

But even in the most advanced countries, subsistence agriculture supports the economies, and export earnings, vital to industrial growth, are chiefly derived from primary produce and raw materials and hence are vulnerable to the vagaries of the world market, and limited by the slow growth of its demand.

In Nigeria, for example, 75% of the population ekes out a living from small farming or fishing. Agricultural exports—mainly coco beans, groundnuts and palm kernels—bring in about 85% of the country's foreign exchange earnings—$480 million/year. Government marketing boards, which control exports of the primary products, have helped stabilize the industry and build up sterling reserves. These have played an important role in basic economic development.

Ghana's much narrower economy is dependent on coco exports for about 60% of its income. Kenya's earnings come mostly from coffee, sisal, and tea; Tanganyika's, from sisal, coffee, cotton, and diamonds.

Agriculture is king even in the Federation of Rhodesia and Nyasaland, the most industralized nation in Black Africa and one of the world's leading copper producers. Although its highly advanced copper industry accounts for over 50% of the value of total exports, agriculture still supports a much higher proportion of the African population than any other form of economic activity.

In French Africa, the picture is much the same—but worse. Although rich mineral resources have been discovered, most still lie buried in the jungle, and industry is rudimentary.

to secede from the Federation. Welensky is determined to hold the Federation intact after independence. If the Federation does break up, Southern Rhodesia may turn towards the Union of South Africa and, like the Union, face isolation from the markets of Black Africa—and the threat of further strife.

Battle of the Century: To sense the full significance of Black Africa's fight to emerge, you have to see it in the perspective of the great struggle between Communism and the Western world.

Africa has become a prime target for Communist domination. The campaign is being waged on many levels —with credits and technical aid (so far, to Guinea, Ghana, and Ethiopia), with propaganda and infiltration, with cultural exchange programs.

To date, Moscow's biggest success has been in Guinea— although some Africans deny that Toure has slipped under Communist control. Western

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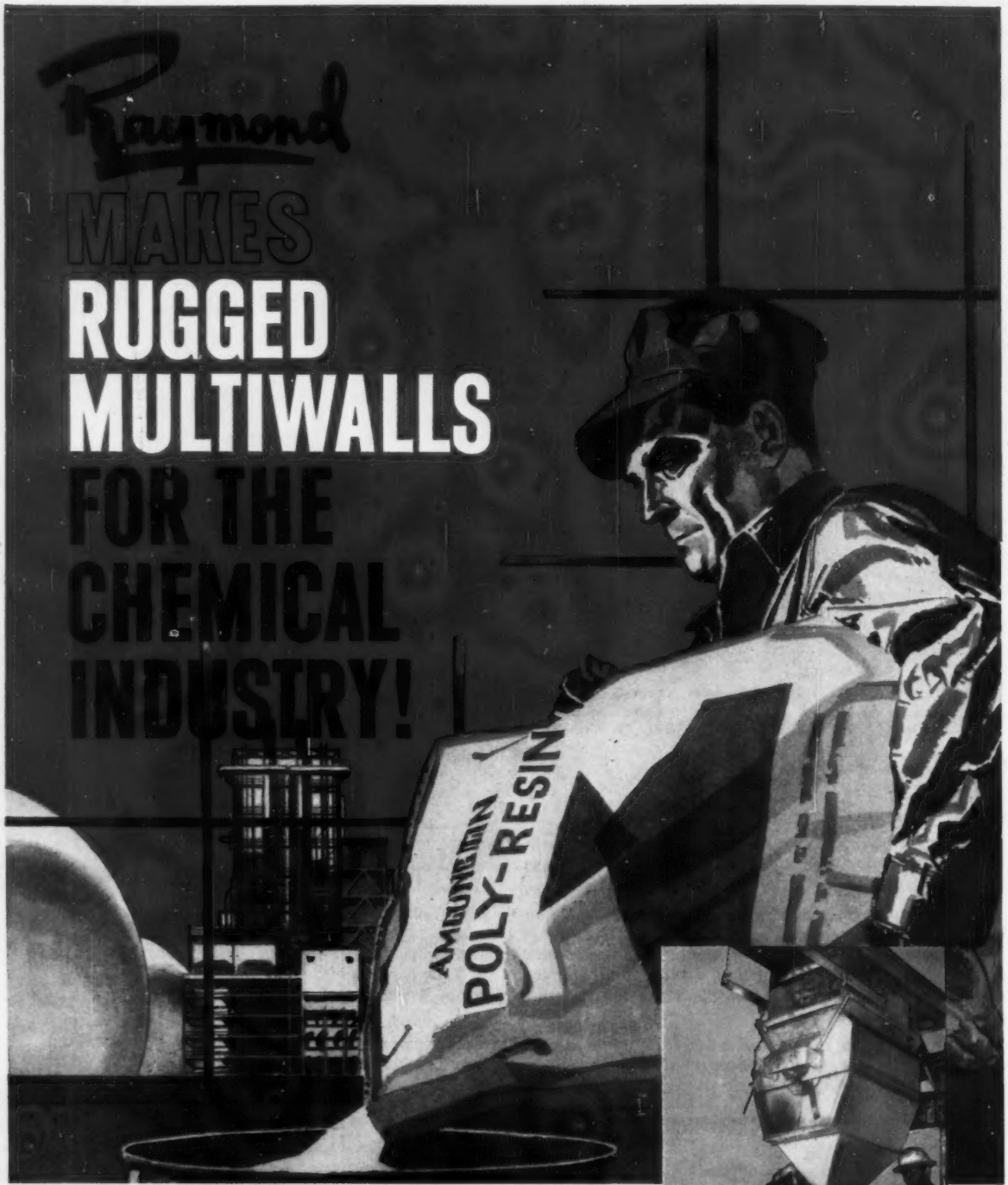

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SPECIAL REPORT

BLACK AFRICA

Timetable for Revolution

Few people could have predicted the incredible speed of Black Africa's political revolution. The wave of independence, which had built up in the post-war liberation of much of North Africa, crested when Britain gave Ghana its freedom in 1957, since then has swept over the continent like a tidal-wave.

In '58, Guinea wrenched free from France. This year 14 more new African states raised their flags by the end of August: The French African states of Malagasy (Madagascar), Gabon, Congo, Central African Republic, Chad, Niger, Dahomey, Upper Volta, Ivory Coast, Mali Federation (since split into Senegal and Mali Republic); the French trusteeships Togo and Cameroon; the Belgian Congo; and Somali, formed from former British and Italian protectorships.

And last week Nigeria—potentially the most important nation in Black Africa—slipped into independence after several years of virtual internal autonomy.

More will follow. Next month, Mauritania will become an independent republic in the French Community. The British colony of Sierra Leone is already scheduled for independence next April. Later, though no dates have been set, the ranks of the independents will be joined by most of what remains of British Africa—Tanganyika, Kenya, Uganda, probably in that order. And sooner or later, intact or not, the Federation of Rhodesia and Nyasaland will finally get free from Britain.

But the wave of independence breaks against the ramparts of Portugese Africa—the colonies of Angola, Mozambique, Portugese Guinea—and of Spain's possessions. Here colonialism still lives in its bitterest tradition. The tides of revolt are bound to creep in through the walls, but the colonial masters are determined to hold on with force to the bitter end. That end seems inevitable, but it may not come until the rest of Black Africa grows strong enough to exert the pressure which may be necessary to bring it about.

governments, of course, worry about how long a country can take Communist aid without losing its independence.

The Congo explosion may have been a critical turning point in history. If the Russians had succeeded in taking over, the West would have either gone to war or seen Africa move a lot closer to eventual control by the Communists.

By overplaying their hand, the Russians seems to have suffered a major setback. Africans recoiled at the naked Soviet intervention in Congolese politics, and at Soviet defiance of the U.N., which to most of them represents the keystone of peace and the main means of making their weight felt in the world.

The Congo incident, and Nikita Khrushchev's belligerent behavior at the U.N., probably served to clarify for the African leaders the fact that they need the West as much as the West needs them.

But this realization doesn't alter the grim facts of Africa's economic life, and the dangers of political explosions. Russia will continue to offer tempting chunks of economic progress. And if the new states cannot get more help from the West, they will have no alternative but to take it where they can.

Even if the West does embark on a massive economic aid program for Africa, real political and economic stability is a good ways off.

For businessmen, Black Africa won't offer an ideal, guaranteed-safe investment climate for a long time. But for those companies venturesome enough to take the risk, there is the promise that their investments will not only pay off in themselves, but will help form the foundation of a safer future.

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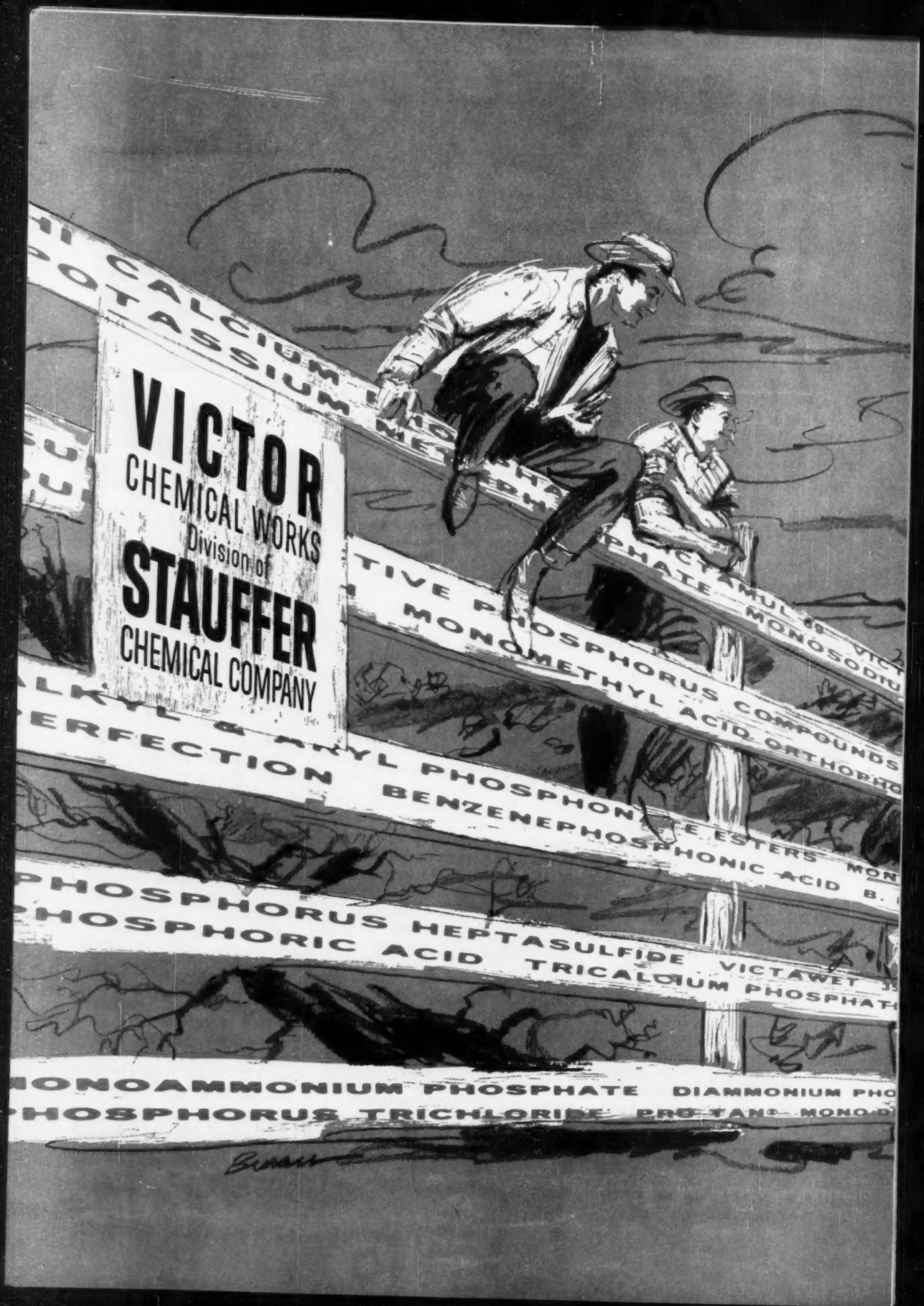
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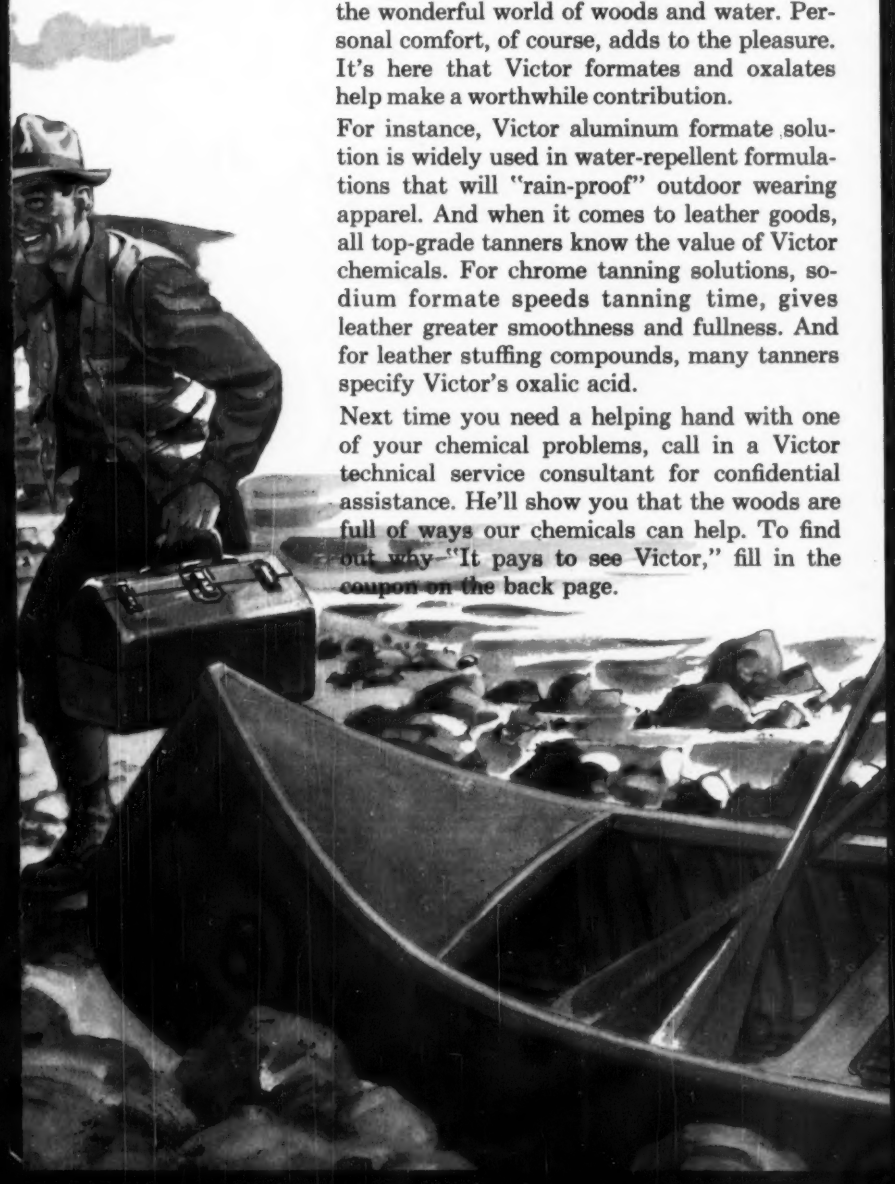

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Next time you need a helping hand with one of your chemical problems, call in a Victor technical service consultant for confidential assistance. He'll show you that the woods are full of ways our chemicals can help. To find out why "It pays to see Victor," fill in the coupon on the back page.

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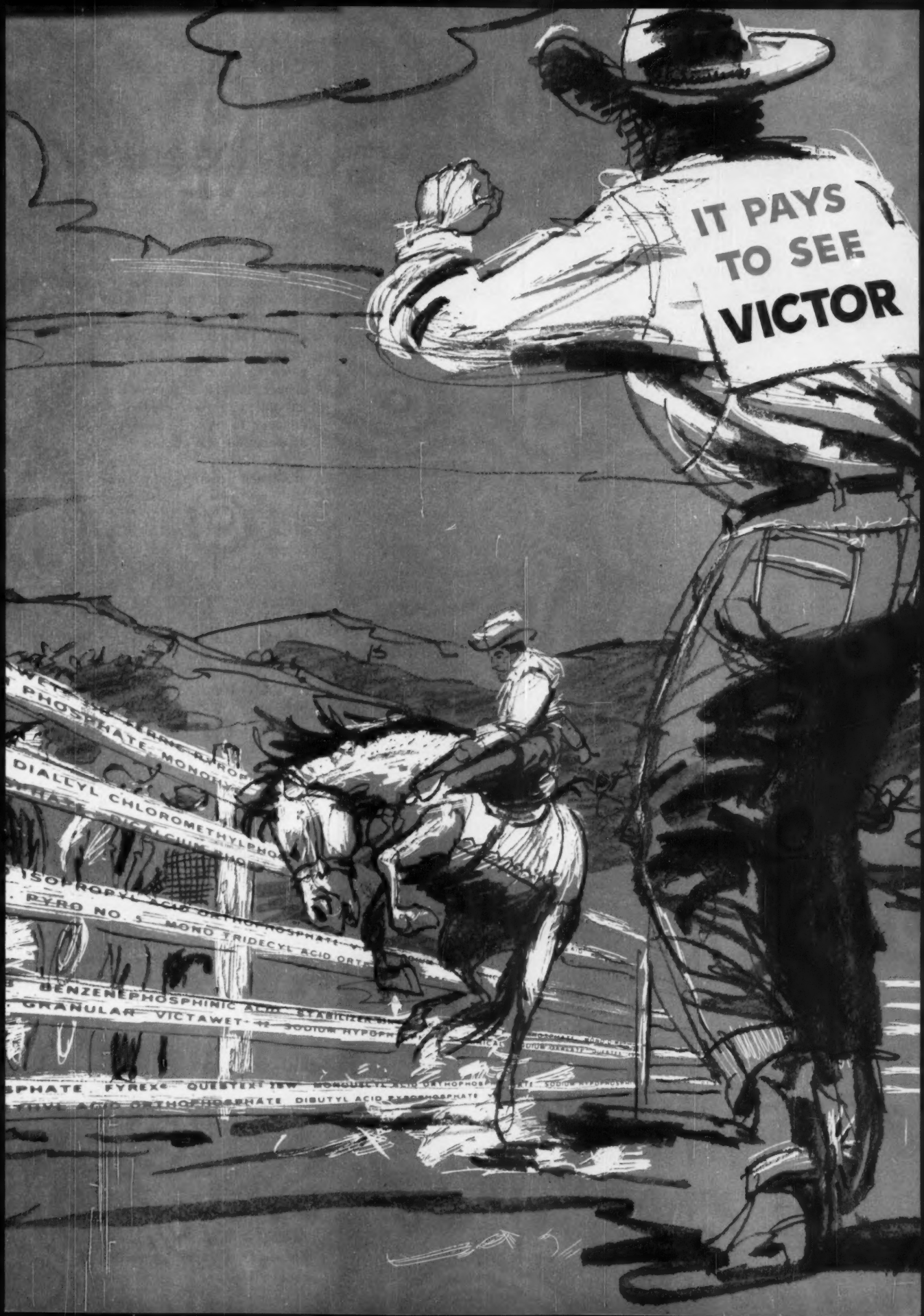
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ENGINEERING

Research:

A rash of new developments are pacing the copper industry's swing from conservative, empirical processing to up-to-date, research-backed operations. In the mills are techniques for using tonnage quantities of oxygen in smelting, and for eliminating "poling" (using green lumber as a reducing agent). The trend is also illustrated by copper producers' call to process engineering firms for help in designing copper plants. Behind these changes in technology: copper producers' determination to resist the market invasion by aluminum and plastics.

Translating just one segment of this processing progress into dollars and cents spent for chemicals shows that an estimated 1,400 cu. ft. (56¢ worth) of oxygen will be used for each ton of copper processed. Since the U.S. is now producing over 1 million tons of copper each year, there's a potential market for $600,000/year worth of oxygen. So far, of course, the oxygen technique is in the under-study status; Kennecott Copper Co. (Garfield, Utah), for example, is considering it for a $750,000 soon-to-be-constructed pilot plant (*CW, Aug. 20, p. 68*).

Some changes already have been accepted on a minor scale. Phelps Dodge Corp. (Douglas, Ariz.) is now using reformed gas to eliminate the poling operation. In one $500,000 plant, P-D is saving at least $50,000/year this way. And Kennecott is now investigating another system that will also use reformed gas, side-step poling.

Almost as novel as these technological improvements is the copper industry's consultation with chemical engineering firms for design work. The world's largest copper producer, Kennecott employed M. W. Kellogg (New York) to build its $30-million, 198,000-tons/year electrolytic copper refinery.

A key development in the engineering of this Baltimore plant is more accurately termed a materials-handling improvement rather than one of chemical processing: the laborsaving use of straddle carriers and fork-lift trucks instead of small-gauge rail cars. But it was Kellogg's CPI experience with plastic pipe that led it to specify the extensive use of plastic piping—sul-

A slag of impurities pours out of Kennecott Copper converting furnace.

Copper Makers' Competitive Weapon

furic acid (16% concentration) is so piped 95,000 ft. Another feature is the continuous casting system.

These advances, when put into other plants, would provide a welcome boost to the sagging copper industry. U.S. domestic use and export of refined copper dropped from 1.8 million tons in '56 to 1.6 million in '58. (The '59 figure isn't particularly significant because of a five-months strike.)

During each of these years, on the other hand, plastics and aluminum consumption has grown about 5%—partly by making inroads into copper markets. One of the copper industry's steps to counter the gains by these materials is to upgrade its product—the new Kennecott plant purifies copper 0.7%—from 99.2% to 99.9%.

Hot Upgrading: Smelting is the series of operations required to bring concentration of the copper up 25-30% to this 99.2% figure. And it is in the three smelting furnaces — the roaster, the reverberatory furnace and the converter—that the use of oxygen produces savings.

Smelting fits into the copper processing scheme after the ore has been crushed, ground, floated, thickened and filtered. These steps concentrate ore from 1 to 2% copper content (as found in the U.S.; South American and African ores are far richer) to as high as 25-30% copper content.

In roasting, first step after upgrading, heat causes the copper sulfide to form gaseous sulfur dioxide. Oxygen usage has already moved into this part of smelting in The International Nickel Co. of Canada plant (Sudbury, Ont.).

Oxygen-enriched air saves on fuel and yields sulfur dioxide of high enough quality to be made readily into profitable sulfuric acid.

For the 10-15% of the world's copper ore that is oxide rather than sulfide, the copper is leached out of the ore—or a new Kennecott process is used: leach-precipitation-flotation as an integrated scheme.

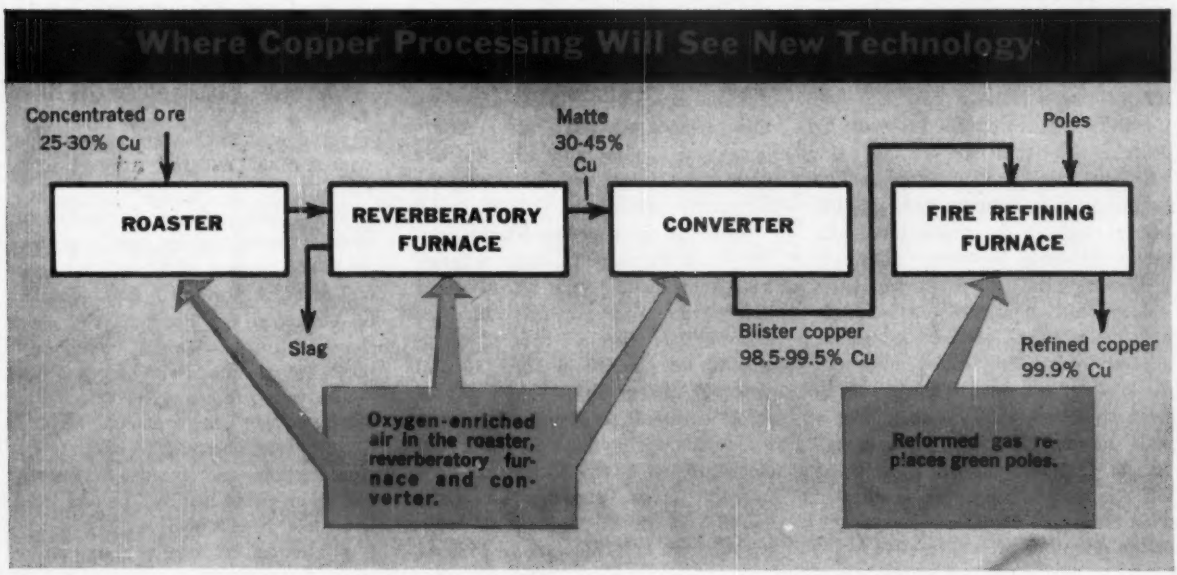
From the roaster the copper stream is fed into a reverberatory furnace. Here a mixture of iron sulfide and copper sulfide—called matte—forms. Air feeds the fire in this furnace. But Kennecott's research team feels it may soon be able to show the advantage of enriching this air with oxygen; the reverberatory furnace will exhaust less nitrogen, save on waste heat—possibly as much as 50%.

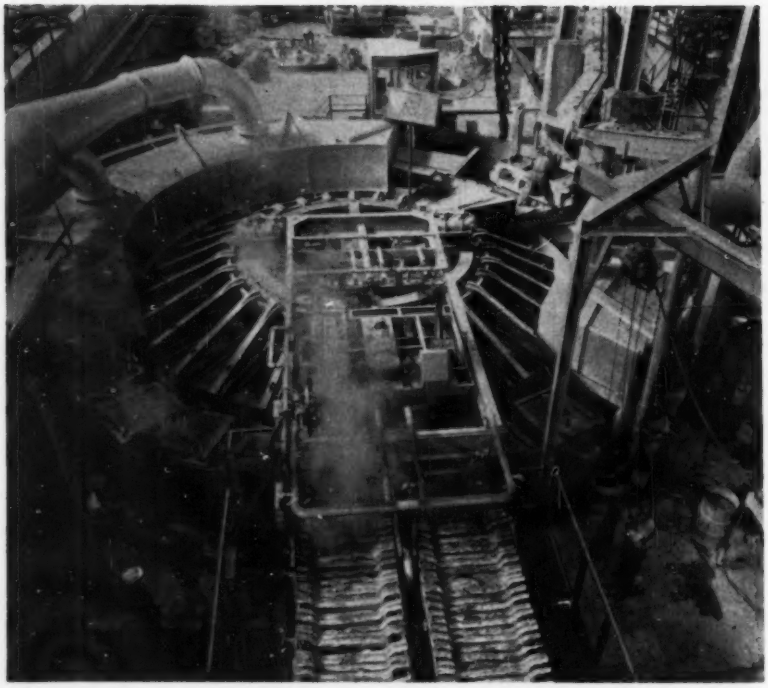
From this furnace the matte goes to a converter, where thin streams of air are forced through it. This oxidizes the remaining copper sulfide to copper, which is moved to a holding furnace and cast as blister copper (98.5-99.5% purity) in slabs or cakes.

Process-Speeders: New technology is finding its way into the smelting furnaces and mining facilities at Anaconda Copper Co. (Anaconda, Mont.). This company, the second-largest copper producer, owns 40% of the Western world's known copper resources—although it only produces 15% of the West's output. It is now building a 370-ft.-diameter thickener, reportedly the largest in the world. For winter use, a system to spray ore cars with antifreeze, is easing the burden on banks of infrared heaters—the earlier way of keeping cars unfrozen. Electronic conveyors and bins minimize spillage, reduce dust-control problems. Three new ball mills increase grinding capacity. And six new 28-cell flotation machines round out the influx of automated and instrumented equipment to this smelting plant.

All these developments stem from a recent emphasis on research and development — for example, a new Anaconda R&D center is now under construction; Kennecott's relatively new research center was built only six years ago—the first of its kind in the copper industry.

Poling: After smelting, the copper is ready for furnace or fire refining and then electrolytic refining. The furnace step involves the poling operation. Blister copper is melted in the furnace





Casting wheel's tricky take-off and conveyor in Kennecott refinery.

and compressed air is blown in. The oxygen forms oxides of many of the copper impurities. Silica is then added; it forms a slag that floats above the molten copper and is continuously skimmed off.

When all the slag has formed, cuprous oxide starts to occur, and this oxide must be reduced to pure copper. For years this step was done exclusively by stirring green logs into the molten bath. The hydrocarbons in the wood react with the oxide to form carbon dioxide, and leave behind 99+% pure copper.

Phelps Dodge began cutting out the use of poles about a year ago and substituted reformed gas. It's made by autoclaving steam and natural gas, which is then piped into the molten copper mass. It does the reduction job just as well as the poles, eliminates bulky handling problems and cuts processing time and labor needs.

Kennecott expects its experiments with a similar use of reformed gas to do away with poling will open the way to making reformed gas by using steam at almost 2000 F and mixing it with hot natural gas in a "lancing" device. Then the gas will be injected into the molten copper oxide directly from the lances. Expected saving: 90% of the poling costs.

Materials: Besides refining techniques, such as this one, the copper industry is more sophisticated in its use of process materials. Standard Steel Corp. (Los Angeles) has built a 48-ft.-long, 4½-ft.-diameter stainless steel calciner for an undisclosed southwestern U.S. smelter. The calciner will permit use of lime-laden copper ore, which is now unattractive to refiners.

A new process to economically upgrade this ore takes the crushed ore, coke and a halide salt into the calciner, where it is mixed and heated at 1500 F. The copper mixture that is formed is cooled, ground in a ball mill and concentrated by flotation. All this replaces the prohibitively costly system of acid-leaching the lime ore with sulfuric acid and recovering the copper by electrolysis.

Although these advanced techniques are giving the copper industry a firmer base, there is still a long road ahead before a stable process industry evolves. The price of copper, which was up to 46¢/lb. in July '56 and down to 25¢/lb. in July '58, is now fairly constant at 30¢/lb. However, the immediate outlook is somewhat bleak because of the African political situation (Africa accounts for about one-fifth of world production), labor negotiations in Chile (about 15% of world output) and general industrial activity. Long range, three forces will work to stabilize the copper industry: (1) most of the production capacity will be in the hands of large companies that can afford to not press the market with overproduction; (2) strong unionization is likely to force weak producers out of the picture; (3) government interest in copper production throughout the world will help stabilize labor and price situations.

Aside from these market considerations, oxygen usage, elimination of the archaic poling operation and a move toward further using CPI engineering will bolster the copper industry. It remains to be seen how effectively copper makers use these techniques to keep markets from going to plastics and aluminum makers.

New Processes Star

Six processes drew special attention at the 43rd National Meeting of the American Institute of Chemical Engineers in Tulsa, Okla., last week.

• Oil from natural gas containing as little petroleum as 0.1 gal./1,000 cu.ft. can now be processed economically in a new short cycle adsorption system. Engineers from Phillips Petroleum Co. (Bartlesville, Okla.) say that the new process was stimulated by recent low-petroleum natural gas discoveries.

The new process features onstream chromatographic analysis and an adsorption chamber with an internally insulated bed. This chamber can be heated or cooled in a few minutes. The process requires two adsorption towers, a furnace to supply hot stripping gas, a gas pump to circulate this gas and heat exchangers to cool and condense the material stripped from the bed.

• Alkylate, which is used in blended motor fuels, is now made for $600/bbl. instead of $1,500/bbl., the cost of a few years ago. E. R. Fenske of Universal Oil Products Co. says that hydrogen fluoride alkylation units are credited with the savings —and with producing higher quality alkylate. New developments include a new isostripper, reduced catalyst consumption, and greatly minimized corrosion problems by use of carbon steel and Monel.

• Thermal cracking of slurry oil to

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Tecquinol, because of its reduction potential, is widely used to control polymerization reactions, particularly those catalyzed by peroxides. For example, it is being used in acrylates, methacrylates, vinyl acetate, and other vinyl monomers. Tecquinol is effective both in inhibiting the monomer during transit or storage, and in stopping the polymerization reaction when the desired conditions have been reached. Because of its antioxidant properties, it also finds use as an inhibitor for industrial fats or oils and as an antiskinning agent for paints and varnishes.

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sulfuric acid → **hydroquinone-mono- or di-sulfonic acid**

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hydrogen → **quinitol**

sodium chlorate → **benzoquinone**

benzoquinone → **quinhydrone**

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produce a low-cost material for olefins has been accomplished by the Lion Oil Co., division of Monsanto Chemical Co. (El Dorado, Ark.). R. A. Franz says slurry oil, or the bottoms from catalytic crackers, contains about a 50-50 mixture of paraffins and aromatics. The new process for breaking down these paraffins into olefins is still under investigation and details were not disclosed.

• A commercial process for "sweetening" or removing sulfur compounds from hydrocarbons was detailed by Linde Co. (Houston, Tex.). In the process, the hydrocarbon flows down through a molecular sieve which absorbs the sulfur compounds. These wastes are removed periodically by a hot gas purge. The bed is then cooled with high-sulfur liquid feed and operation begins again. This process is said to eliminate problems of the caustic scrubbing technique.

• Commercial oxidation of hydrocarbons using 95% pure oxygen instead of air was covered by James M. Robertson of Celanese Chemical Co. (Corpus Christi, Tex.). The process increases the yield of chemicals such as formaldehyde, ethylene oxide, methanol and methyl ethyl ketone from propane and butane feedstocks. A 35 ton/day oxygen unit was built to furnish the necessary oxygen.

• Future demand for higher octane gasoline will be met with present equipment, say Sun Oil Co. (Marcus Hook, Pa.) engineers. The processing trick is to choose a heavy, naphthene-rich fraction of a catalytically cracked gasoline. When this cut is reformed, olefins, which lower the octane number, are minimized. They are now in the high 90's and a 105-octane fuel component may be required by '70.

PROCESSES

Small-Scale Hydrogen Plant: Anhydrous ammonia is the feedstock for hydrogen production in a package plant developed by Electric Furnace Co. (Salem, O.). The unit is based on research by Dow Chemical and Armour Industrial Chemical. The process is two-stage: first, ammonia is dissociated in a conventional ammonia dissociator; then the hydrogen is purified in a continuously cycling adsorption unit. Product purities can be controlled to 82-98% hydrogen (the remainder is nitrogen). Capacities vary from 750 to 10,000 standard cu.ft./hour, depending on plant size. All plants are skid-mounted; sizes range upward from 6 ft. wide, 12 ft. long, 10 ft. high for the 750-scfh. plant. Investment and operating costs are said to be competitive.

•

Cyclo-Steel: The Russians are claiming success with a smelting process that CHEMICAL WEEK described as a British development in 1957 (*CW, Jan. 25, '57, p. 94*). Kazakh Academy of Science (Kazakh Republic) says it is successfully smelting iron ore in a pilot operation by a process that whirls pulverized ore, coal and air together in a high-speed cyclone.

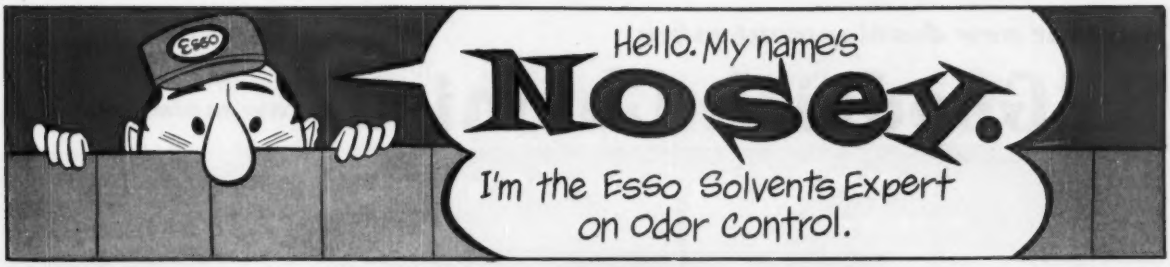
Linear velocities in the cyclone are almost 500 ft./second; the smelting temperature is claimed to be about 3000 F (a modern blast furnace operates at temperatures up to 2700 F). The high temperatures are attributed to complete combustion of all impurities, including sulfur.

Molten iron and slag fall to the bottom of the furnace, while gaseous combustion products escape at the top. The Russian engineers claim to be able to separate other metals, such as lead and zinc, from the iron in the ore. (This can also be claimed for other processes if there is no load of solids on the furnace hearth—e.g., the Strategic-Udy process—(*CW, Aug. 13, p. 85*).

•

Palladium Alloy: A new silver-palladium alloy for hydrogen purification has been developed by J. Bishop & Co. (Malvern, Pa.). Claimed advantages over pure palladium in hydrogen diffusion cells: 25% cheaper; does not disintegrate upon high-temperature heating and cooling; at least twice as permeable to hydrogen. In the hydrogen cell a gaseous mixture is subjected to over 50 psi. in one-half of the cell. As the temperature is raised above 500 F only the hydrogen in the mixture diffuses through a silver-palladium membrane into the low-pressure half of the cell. The ultrapure hydrogen obtained with this membrane is used in powder metallurgy (*CW, Feb. 27, p. 95*), in semiconductors, and as rocket fuel.

The National Metals Exposition and Congress will show the cell in Philadelphia Oct. 17-21.



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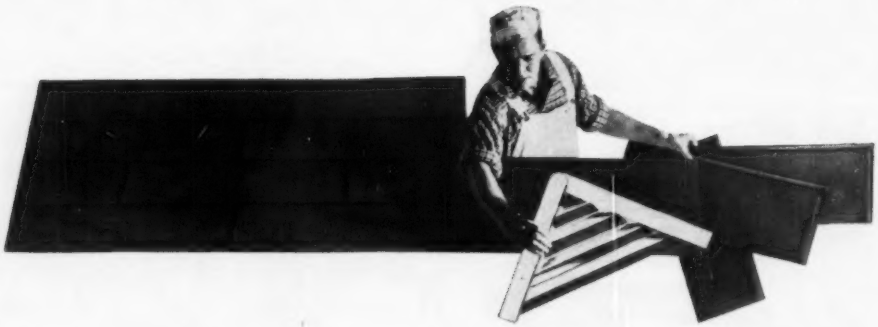

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Here are several excellent examples of how manufacturers are taking advantage of the unusual properties of Geon vinyl on aluminum to open new markets and improve existing products. To learn more, write Dept. GH-7, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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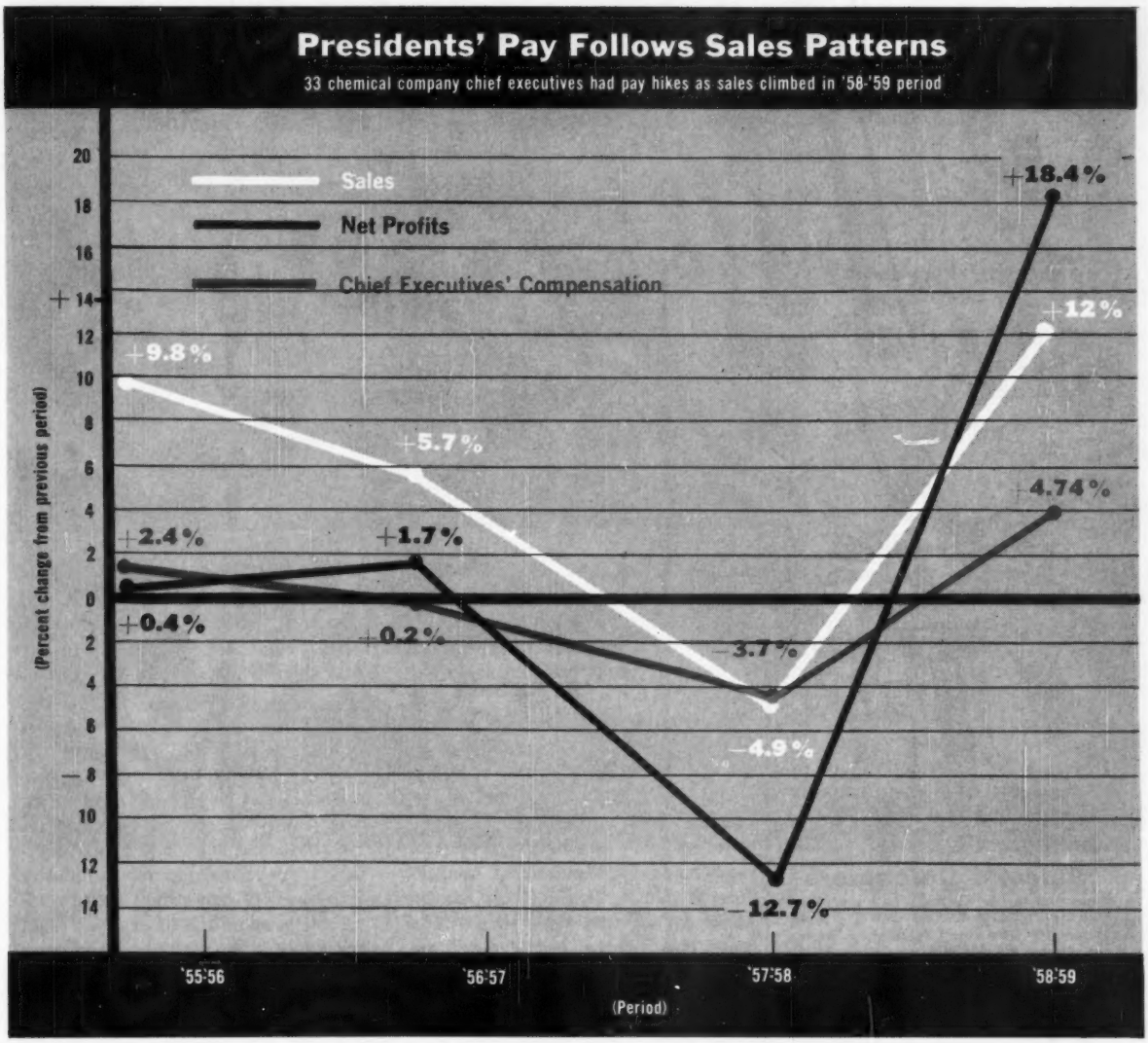

Slim Raises Mark CPI Executives' Pay Trend

Compensation of chief executive officers in chemical process industries, including soaps, cosmetics and pharmaceuticals, rose last year along with improved sales patterns. But while average compensation was up within the CPI, executives' compensation has failed to keep pace with that of industry generally. It is following the CPI's slowly rising sales trend, damped by the industry's reduced profit margins. Outlook for this year-compensation to follow the so-far-rising sales averages.

Among chief executives of 33 companies in the chemical, paper, petroleum and natural gas, nonferrous metals, and rubber industries, total compensation, including bonuses and deferred income, went up 4.74% in '59, over '58.

Compensation tends to follow company sales more than it does profits (*see graph*), and '59's increase represents a change from '58's findings.

In '58, the chief executive's compensation dropped about 4% from the previous year as the result of a 13% drop in sales. The average chief executive of this group earned $104,000 on sales of $122.5 million and profits of $35.4 million (*see p. 80*).

In the soap, cosmetics and pharmaceutical industries, reported on this year for the first time, chief executives' total compensation, including deferred income and bonuses, rose 2% in '59 over '58, while sales were up 8% and profits up 11%. The average chief executive officer of the 21 soap and cosmetic and pharmaceutical companies surveyed—representing aggregate sales of $1.97 billion—earned about $108,000 on sales of $100

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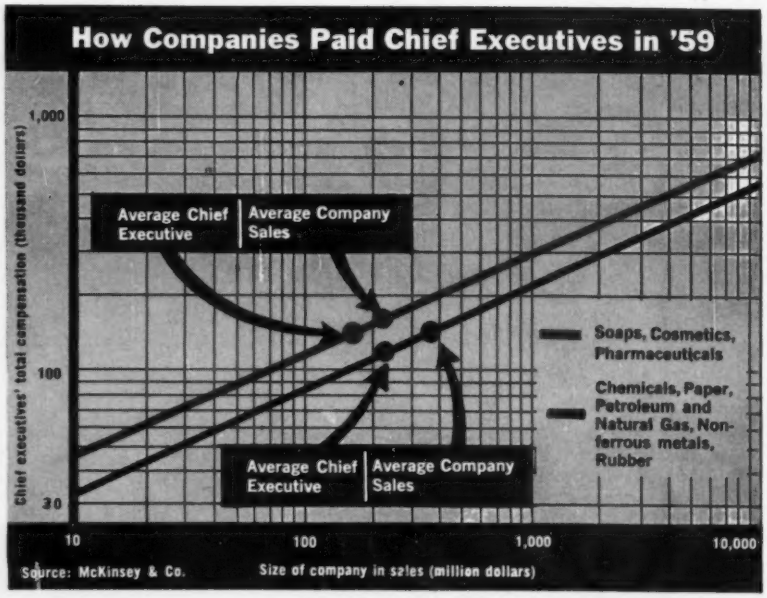


million and profits of $15 million.

Behind the Pack: But in spite of their high pay, the chief executives in both groups failed to keep pace with their counterparts in other industries. The average increase for chief executives in all industries was 8% in '59 over '58, with average sales increases of 9%, and profit increases of 21%.

These analyses came from records of 605 publicly owned companies and were made by management consultants McKinsey & Co. (New York). McKinsey's figures show that over a great part of the last decade, top executive compensation in the CPI fields surveyed failed to rise at a comparable rate with industry generally. This is in spite of the industry's above-average growth in both sales and profits.

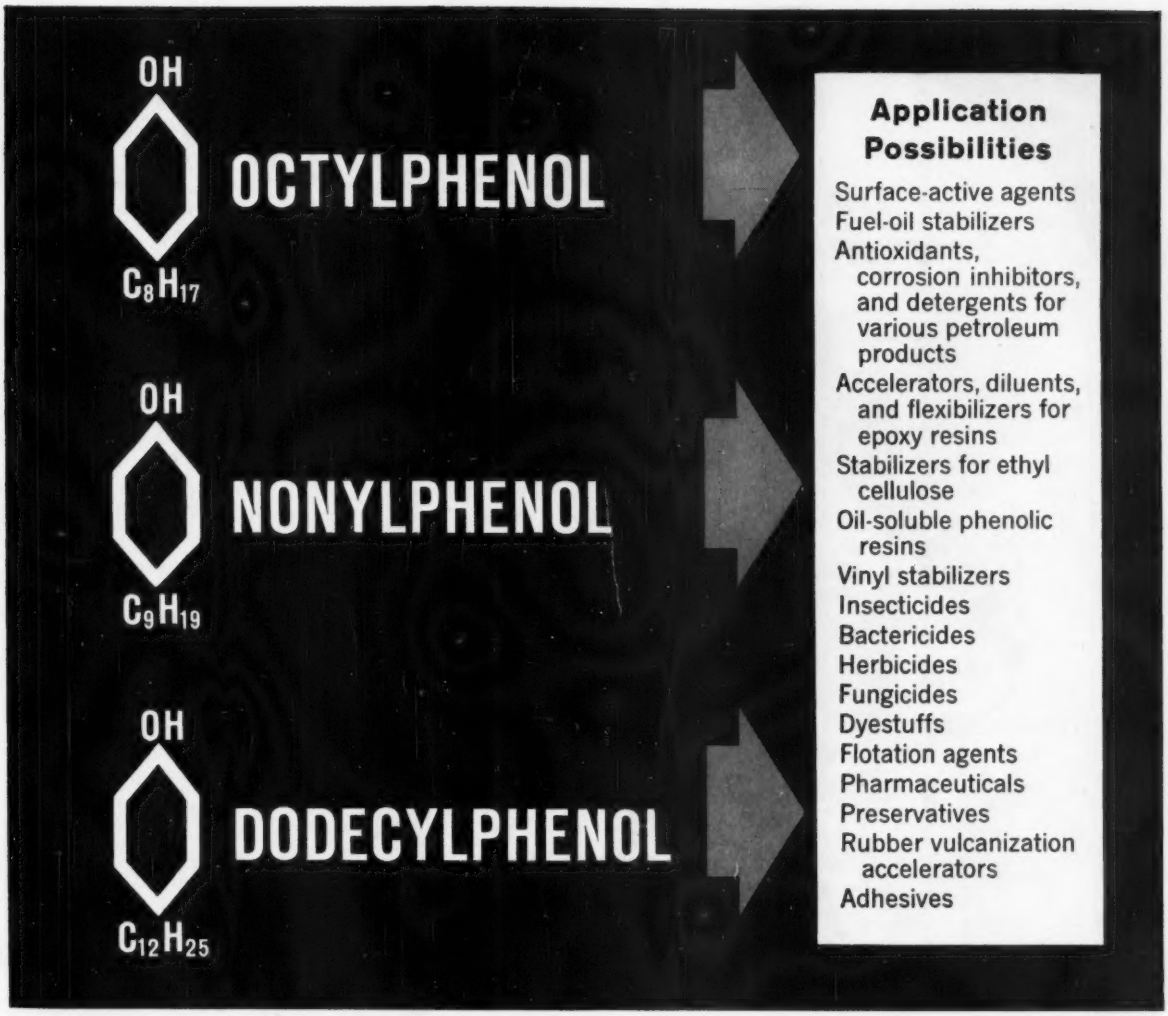
Drugs, Cosmetics: From '53 to '59, for example, top executive compensation in the drug, cosmetic, and soap industry rose 16%, the same as the six-year rise for industry generally. But while the compensation increase was the same, the growths of sales and profits in the soap, cosmetics, and drug groups far outstripped those of general industry. The chemicals group sales went up 90% and profits, 118%; in industry generally sales and profits went up but 43% and 31% respectively. Put another way, if sales and profits in both groups had remained the same, compensation levels of chief executives in the chemicals group would have declined some 7%.

Other Chemicals: In the other CPI groups—chemicals, paper, petroleum and natural gas, nonferrous metals and rubber—the pattern is even less attractive. In the CPI group over the six-year period, sales rose 54%, profits 71%, yet chief executives' compensation increased only 13%.

The survey reveals another point: Chief executives of the larger chemical companies enjoy a very high earnings level relative to other industry executives of companies with comparable sales on the other hand, chief executives at smaller companies have a slightly lower-than-average earnings level.

High Enough? Most management in the process industries is loath to talk about its salaries and compensation policies with respect to chief executives, except in the most philosophical terms. Nevertheless, some chemical managers and management consultants are inclined to agree with McKinsey's view that the slower climb of CPI chief executives compensation is because many executives were receiving relatively fine compensation at the start of the period, didn't have so far to climb. Moreover, although compensation tends to follow sales, it's evident that profits play some part in its determination. Slimming profit margins in the process industries, say observers, have probably acted to slow compensation growth.

Outlook: For the future, chief exec-



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LITERATURE AND SAMPLES

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utives' compensation is expected to continue to mainly follow sales patterns. And chances are slim that chemical industry management will break out of its relatively average pattern unless some startling new factors enter the picture.

ICWU Tightens Belt

The International Chemical Workers Union has taken new steps to tighten its organizing procedures and concentrate its resources for membership expansion.

At its annual convention last fortnight in Atlantic City, delegates voted to convene every two years in the future—to save convention expenses. On the organizing front, they heard how the union is activating a new program of "joint councils" of locals.

Skyrocketing costs and the tremendous demands on the time of officers and others who arrange the conventions prompted delegates to switch from annual to biennial conventions. ICWU will now meet only in even-numbered years, a change expected to save between $150,000 and $160,000 every other year, most of it at the local level. It's estimated, for example, that the '58 ICWU convention cost locals a total of $130,200, the international about $22,000, with an additional $10,000 represented in extra staff expenses and miscellaneous items.

Joint Program: Delegates heard the union's progress in activating proposals made last year that would set up joint councils and so-called composite locals. Purpose of these organizations is to make the small bargaining units characteristic of ICWU's makeup more effective through collective action. Joint regional councils would include composite locals, if any —single locals made up of very small bargaining units holding different contracts in an area—and other larger locals. The executive boards of both kinds would form the joint council which, in turn, would operate through business representatives in the region. The latter would be employed full time, would devote themselves to servicing local needs, to organizing and to act as liaison with the international.

ICWU has set a number of target areas for development of composite locals or joint councils. Immediate

goals are Kansas City, Mo., Houston, Monroe, La., St. Louis, Franklin, La., Jackson, Miss., Chicago, Cincinnati, Louisville, Atlanta, Pittsburgh, Pa., Cleveland, Toronto, Ont., Montreal, Que., Buffalo, Boston, Philadelphia. Closest to fruition are those at Louisville, Cleveland, Toronto, Philadelphia. The union has already chartered one joint council, in the Florida phosphate fields.

Local Emphasis: With extended time between conventions and with new emphasis on the regional activities, it can be expected that the ICWU International will increase its service to, and communications with, local groups. In its report to the convention, the union executive board pointed out that it has already started to do so.

ICWU President Walter Mitchell and Secretary-Treasurer Marshall Shafer, as well as the union's nine regional vice-presidents, were re-elected without opposition. Other actions: a new "political action" program in response to management's increased political activities, enthusiastic endorsement of Democratic Presidential candidate John F. Kennedy, and a decision to meet at Las Vegas in '62.

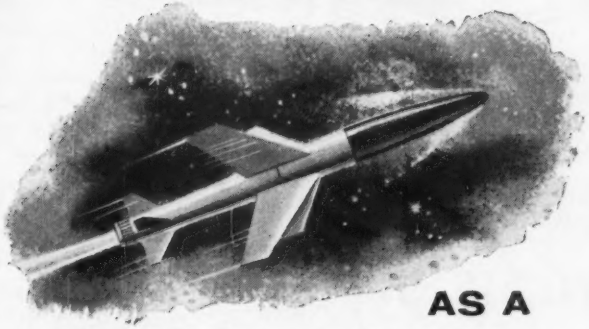
Europe's Training Pays

United States chemical companies setting up business in Europe with a staff of professionally trained managers will find that this doesn't give them the advantage over European competitors that they may have counted on.

After experimenting for the past decade with U.S. management training methods, imported with Marshall Plan aid at the end of the '40s, Western Europe has developed a large class of trained managers who have played a big part in the area's recent industrial surge. Today most top European chemical companies are run pretty much the same way as their U.S. counterparts—same budgetary control, same investment forecasting, same exchange of information among firms. The main distinction is a different approach to human relations within the firm, due to different cultural patterns in the U.S. and Europe.

These are the findings of a survey of nearly 200 industrialists, educators and government officials from the 18 member countries of the Organization

ROCKETING IN POPULARITY



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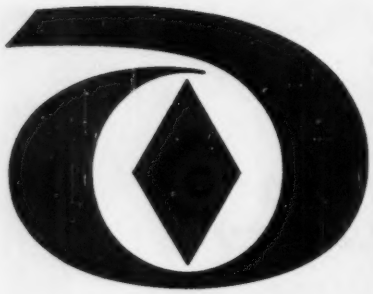

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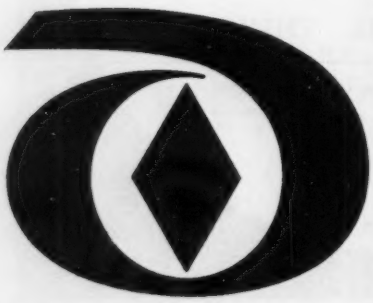

for European Economic Cooperation who gathered in Paris recently for the seventh International Conference on Management Training sponsored by OEEC's European Productivity Agency. After a look at the present state of European management training, the experts stressed the need for more professors, more trained researchers, and closer cooperation between industry and the universities.

Leading development in the past decade, they say, is the gradual acceptance by European industry of the need for management training. Most big and middle-size firms, including old-fashioned family businesses, now send their top executives to follow courses at the advanced management training centers that have sprung up all over the OEEC area. As a result, training of top managers of all but small firms is as widespread in Europe as it is in the U.S.

LABOR

Atomic Action: Oil, Chemical & Atomic Workers Union, Local 9-288, representing 2,800 employees at the Oak Ridge, Tenn., and Paducah, Ky., atomic facilities of the Atomic Energy Commission, is seeking a 28¢/hour wage increase. Negotiations with Union Carbide Nuclear Co., which operates the plants, are according to terms of a wage reopening clause of a three-year contract that expires in Oct. '61.

•

Socony Election: At the Buffalo refinery of Socony Mobil Oil Co., the National Labor Relations Board has ordered a collective bargaining election among employees. The contest will be between an independent union, Petroleum Union of Buffalo Refinery Employees, which currently represents 250 employees at the plant, and Oil, Chemical & Atomic Workers Union.

LEGAL

Stock Sale: A sale of 350,000 shares of stock by a number of American stockholders in Aluminium, Ltd., has virtually completed the disposal of shares ordered by a U.S. court in '51. The judgment—which resulted from a judicial review of possible illegal connections between the company and Aluminum Co. of America—specified that certain large shareholders in Alcoa dispose of their holdings in Aluminium, Ltd.

•

Pollution Tests: Chemical management in the Baytown, Tex., area may soon get clarification of local anti-pollution laws. To test the laws, a number of cases have recently been heard or are pending. The cases result from charges, some lodged as long as two years ago, which have been delayed because "the law is not clear on who can be held responsible for pollution cases — corporations, agents or individuals," according to the Harris County, Texas, district attorney.

Among the cases involving chemical companies, Diamond Alkali Co. has pleaded no contest in two water-pollution cases.

The company, fined the maximum $200 in each case, said it would appeal; three additional cases against Diamond have been dismissed.

Eight other pollution cases pending include four against Index Chemical Co., three against Jefferson Lake Sulphur Co. and one against Stauffer Chemical Co.

KEY CHANGES

Frank L. Magee to chairman of the board, **Lawrence Litchfield, Jr.,** to president, and **I. W. Wilson** to chairman, finance committee, Aluminum Co. of America (Pittsburgh).

Howard K. Nason to president, new subsidiary, Monsanto Research Corp., and **Erwin G. Somogyi** to vice-president and general manager, Research & Engineering Division, parent company Monsanto Chemical Co. (St. Louis).

Miles M. Zoller to president, **William D. Atteberry** to executive vice-president, **D. R. Carter, Claude O. Dale** and **Melvin F. Chubb** to vice-presidents, Chemicals and Metals Division, The Eagle-Picher Co. (Cincinnati).

George W. Blackwood, William P. Gage, D. W. Robbins, Jr., to board of directors, Cosden Petroleum Corp., subsidiary of W. R. Grace & Co. (Big Spring, Tex.).

Carl A. Setterstrom to vice-president, marketing, Rexall Chemical Co., division of Rexall Drug and Chemical Co. (Los Angeles).

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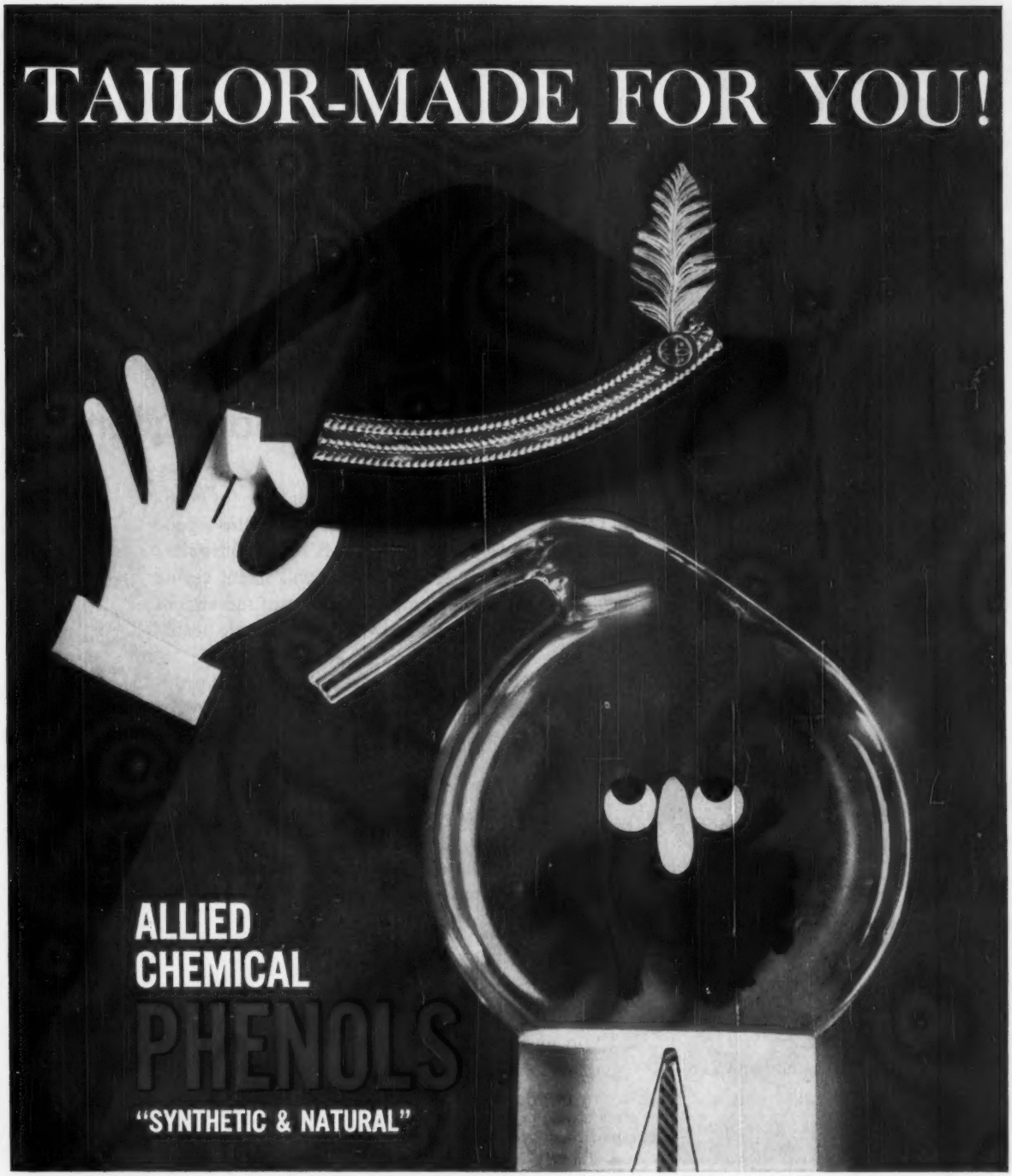

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For more complete technical data and test reports, write for Bulletin 138.

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Technology
Newsletter

CHEMICAL WEEK
October 8, 1960

Research is brightening butyl rubber's market prospects. A new additive under development by American Cyanamid permits vulcanization of butyl items in white or pastel colors, rather than the conventional black (*see p. 92*). And next year Enjay will market butyl latex (e.g., for paints) and will launch a new range of chlorinated butyls called the HT (for high temperature) series. This type of rubber can be processed at temperatures up to 400 F (100 F higher than normal for butyl) and is compatible with a variety of other types of rubber.

•

Neoprene precured by a novel radio frequency energy process is now offered by Udylite Corp. (Detroit). CPD-10 is intended for lining electroplating tanks, chemical storage tanks, etc. Udylite says it has withstood temperatures up to 400 F in some applications.

•

Iron ore containing 6% titanium dioxide will be used to produce 150,000 tons of pig iron annually in what may be the first plant built for the new Strategic-Udy direct reduction process (*CW, Aug. 13, p. 85*). The race to get a plant for this process into operation was touched off by a contract for Koppers of Canada, Ltd. (Toronto) to build the S-U system into a $14-million plant for New Mylamaque Explorations, Ltd. (Toronto). Construction at the Kingston, Ont., location should begin in early '61, and the completion date has been set for first-half '62.

The ore is now lying idle because of the processing difficulties with a high-titanium material. However, S.-U.'s electric furnace process could bring the titanium concentration down to 0.04%, well within customer demands.

•

The Atomic Energy Commission has issued an operating license to The Martin Co. (Baltimore) for its liquid fluidized-bed reactor (LFBR), which promises to produce nuclear power at costs competitive with those of conventional fuels. Under development since '55 (*CW Technology Newsletter, Oct. 31, '59*), the LFBR eliminates the need for conventional neutron-absorbing control rods by suspending a bed of pelletized fuel in an upward moving current of water, which acts both as coolant and moderator. Advantages: safety (malfunction spurts water current, breaks up critical mass), simple fuel fabrication, continuous refueling by pellet replacement, high heat transfer efficiency, and increased plutonium production through elimination of control rods.

•

A radioactive waste disposal system being tested by the Atomic Energy Commission promises to solve the space problems of burying in horizontal pits. The test system mixes finely divided powdered or liquid nuclear wastes with cement and forces the mix down into wells drilled as deep as 1,000 ft. Success of the tests depends on subsequent flow through the shale formations beneath the surface.

Technology

Newsletter

(Continued)

Self-fluxing iron ore is shaping up as a near possibility for the country's blast furnaces. The self-fluxing ore, resulting from further development of the Humboldt Mining Co.'s (Humboldt, Mich.) new ore beneficiation process (*CW Technology Newsletter, Sept. 24*), would combine limestone with iron ore concentrate in a new type of pellet. Since the average blast furnace alternately charges about 0.4 ton of limestone for each 2 tons of ore, the self-fluxing ore is expected to greatly simplify material-handling problems, increase unit capacity of operating furnaces up to 50%. Since most blast furnaces are operating at only about 50% of capacity, Humboldt has not yet started marketing the ore. Its new plant, however, has capacity for 650,000 long tons/year, based on iron ore content.

•

Thermonuclear fusion research will cost Britain $40-60 million in the next three years. But the United Kingdom Atomic Energy Authority has abandoned its plans for the new ICSE (Intermediate Current Stability Experiment), successor to Zeta. The latter is a toroidal tube designed to heat and squeeze gas to atomic fusion temperature. The ICSE project would have cost at least $8.4 million instead of the original cost estimate of $4.2 million. Moreover, it would have occupied the time of 200 scientists and engineers who, according to Research Director Sir William Penney, "are more of a problem to obtain than cash." Smaller plasma experiments will replace the ICSE, and Penney estimates that it will take at least five years, probably 10, before a satisfactory fusion machine is built. "Anyway," he tells McGraw-Hill World News, "what's the rush? Let's do some thinking."

•

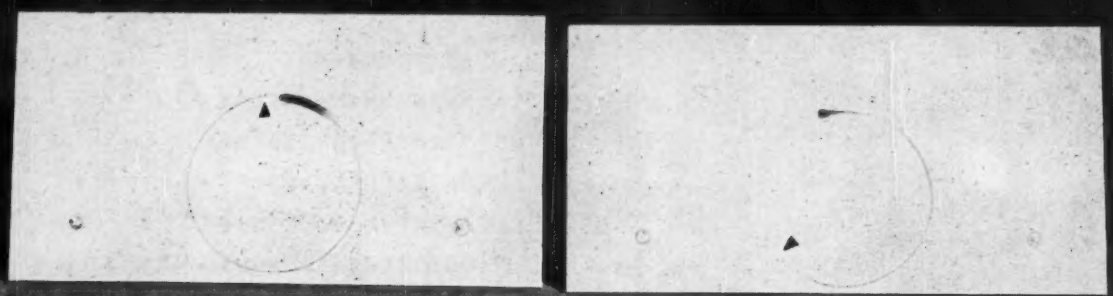
Nickel traces in tobacco may cause lung cancer in smokers, according to a report by F. William Sunderman to the American Society of Clinical Pathologists and the College of American Pathologists. Sunderman found that the metal (absorbed from the soil by tobacco plants) causes lung cancer in rats, suggested that efforts be made to remove nickel.

•

A lightweight fuel-cell utilizing hydrogen, bromine and water has been developed by Ionics, Inc. (Cambridge, Mass.), for use in generating electric power in satellites and space vehicles.

The cell can be recharged using solar cells, which convert energy from sunlight into electricity while a satellite is on the sunny side of the earth. Fuel consumed while the cell is supplying power is regenerated during the charging cycle and is available for re-use.

Minnesota Mining and Manufacturing Co. has delivered a 10-watt propane-fueled thermoelectric generator to the U.S. Coast Guard as part of a feasibility study on the use of thermoelectric power in lighted buoys and other navigation aids.



Test panel on the left, above, was coated with a med. oil phthalic alkyd-based enamel and placed under a Gardner Circular Drying-time Tester with a six-hour cycle. As indicated by the unretouched photograph, hard dry occurred in 5 hours and 50 minutes.

Panel on the right was coated with the same enamel, except that 40% of its alkyd resin was replaced with Neville LX-1000 hydrocarbon resin. The test was conducted under identical conditions of humidity and temperature. Hard dry occurred in 4 hours.

TEST SHOWS ONE ADVANTAGE OF USING NEW NEVILLE LX-1000 RESIN IN YOUR COATINGS

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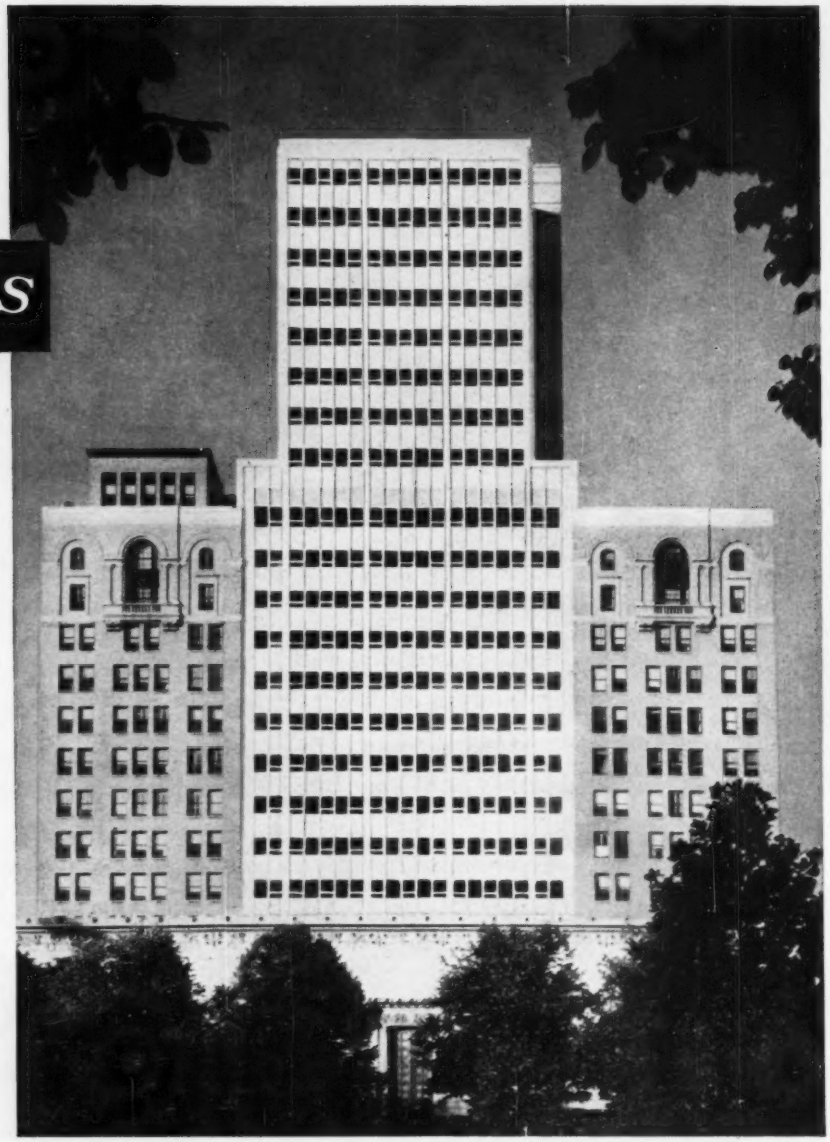

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NEW HEADQUARTERS

Tallest building in Wilmington is the Hercules Tower opened August 1 to house 1,500 employees of the Home Office. The 22-story structure represents the culmination of four decades' growth through continued research and product diversification, and provides room for immediate and long-range expansion. Hercules' new official address is: Hercules Tower, 910 Market Street, Wilmington 99, Del.

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660-9

CHEMICAL MATERIALS FOR INDUSTRY

HERCULES

Typical Rubber Vulcanization Accelerators

Accelerator	*Rubber or Elastomer Use*	*Typical Supplier*
Mixed diarylguanidines	Natural; butadiene-styrene (SBR)	American Cyanamid
Symmetrical di-o-tolylguanidine	Natural; SBR	"
2-mercaptobenzothiazole	Natural; SBR; butyl	"
N-oxydiethylene benzothiazole-2-sulfenamide	Natural; SBR	"
Hexamethylenediamine carbamate	Viton (copolymer of hexafluoropropylene and vinylidene fluoride)	Du Pont
Ethylenediamine carbamate	"	"
Methylene-bis-o-chloroaniline	Urethane elastomers	"
Butyraldehyde-aniline condensation product	Neoprene	"
Dipentamethylenethiuram tetrasulfide	Hypalon (chlorosulfonated polyethylene)	"
N-cyclohexyl-2-benzothiazole-sulfenamide	Natural; SBR; butadiene-acrylonitrile	Monsanto
N-tert-butyl-2- benzothiazole-sulfenamide	"	"
Benzothiazyl disulfide	"	"
Reaction product of butyraldehyde, acetaldehyde and aniline	Hard rubber vulcanizates	"
Zinc dibutyl dithiocarbamate	Dry rubber transparent stocks	Naugatuck Chemical, division of U.S. Rubber
Zinc diethyl dithiocarbamate	Natural; butyl	"
Heptaldehyde-aniline reaction product	Natural	"
Selenium diethyldithiocarbamate	Natural; SBR; butyl	Pennsalt Chemicals
Zinc dimethyldithiocarbamate	Natural; SBR	"
Tetramethylthiuram disulfide	Natural; SBR	R. T. Vanderbilt

New Additives Cut Vulcanization Costs

This week United States Rubber Co.'s Naugatuck Chemical Division is readying the commercial debut of a prill form of Delac-S, a delayed-action rubber accelerator that is widely used in tire manufacturing. This typifies the results of bustling research now going on in accelerators—organic compounds that increase the rate of vulcanization of natural and synthetic rubber. Six major suppliers (above) share the highly competitive, $38-million, 51-million-lbs./year accelerator market—and do most of the research.

While the chemical (N-cyclohexyl-2-benzothiazole sulfenamide) itself isn't new (e.g., Monsanto offers it as Santocure), the small granular form has been developed to ease handling by automatic weighing equipment, minimize dust formation, and speed mixing into rubber masterbatches.

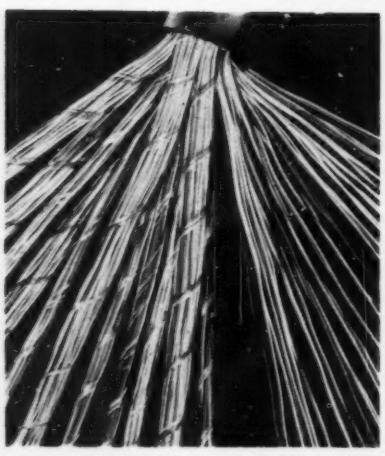
Even a slight competitive edge can mean a big difference in sales, since many of the more than 50 different accelerators now sold are no longer protected by patents and may be offered by more than one manufacturer.

In another switch involving conventional accelerators, Linde Co., division of Union Carbide Corp., has developed a line of chemical-loaded molecular sieves. The sieves are synthetic metal-aluminosilicate crystalline powders that are highly porous and will hold a highly active chemical until it is released by heat or by displacement with another adsorbable material. Accelerators bound this way are inactive during rubber processing and storage but are released at the elevated temperature required for vulcanization or curing.

Novel Properties: New commercial molecular sieves include versions adsorbing anhydrous hydrogen chloride (for resin-cured butyl rubber); di-tertiary-butyl peroxide (silicone rubber); 1,3-diethylthiourea (neoprene); 1,2-dihydroxybenzene (neoprene); di-n-butylamine (natural or synthetics); and piperidine (styrene-butadiene, natural, nitrile rubber, etc.). Because of the novel properties of these products, Linde warns they should first be

Nondiscoloring Promoter Opens New Butyl Markets

Lower-cost white-walled butyl tires; white or pastel-colored auto windshield molding and wire insulation are goals of American Cyanamid's new butyl promoter called Pronar. U.S. butyl sales now total 100,000 long tons, about 55% of which is in tires and tubes, 4% in wire and cable; 7% in auto trim. About 15% increase in total sales is expected for '61 based on present uses only.



tested in the desired rubber formulation. For example, the presence of polar solvents or plasticizers in the formulation may displace the active chemical, destroying its delayed-action effect. The chemical-loaded sieves are supplied by Harwick Standard Chemical Co. (Akron, O.) in the continental U.S.

But applications research, aimed at better utilization of existing accelerators in natural rubber and the older synthetics, is only one part of the manufacturers' responsibility. An increasingly important chore: screening new compounds as potentially cheaper and better replacements for standard accelerators and for possible use in the newer elastomers. Most of the accelerators now in use may be classified as either aldehyde-amines, guanidines, thiazoles, thiazolines, thiuram sulfides, dithiocarbamates, or mercaptoimidazolines. All these classes have been pretty well thumbed over for variations and derivatives, the experts agree, and research is concentrating, instead, on totally new compounds.

New Promoter: While no one will pinpoint the most promising new compounds, an offshoot of this work was revealed by American Cyanamid this week. At its Bound Brook, N.J., rubber chemical laboratories, Cyanamid has found a new promoter for butyl rubber (a promoter is added to the butyl before the accelerator and other vulcanizing ingredients, to impart resilience and other desirable auto tire characteristics).

The conventional promoter for use in butyl tires is Monsanto's Elastopar, the active ingredient of which is N-methyl-N,4-dinitrosoaniline. This compound is supplied in a clay diluent to minimize hazards in handling, costs $2.05-2.12/lb., is used in a range of 0.5%-1.25% of the weight of the butyl. It improves resilience; increases modulus, resistance to abrasion, low-temperature flexibility and electrical resistivity; reduces hardness, cold-flow of unvulcanized gum, and Mooney viscosity.

Despite these advantages, Elastopar and certain other nitroso or oxime promoters tend to darken the product with age or heat, precluding their use in light-colored or white butyl items. Cyanamid's entry, tentatively called Pronar, has a chlorine compound as its active ingredient, reportedly does not stain or discolor the butyl. It opens the door to such possible butyl uses as colored molding for auto windshields, colored wire insulation, and pastel-tinted butyl tires (when silica is substituted for carbon black). Another potential use is in the white walls of butyl tires, according to Ted Vial, commercial development manager of Cyanamid's rubber chemicals department.

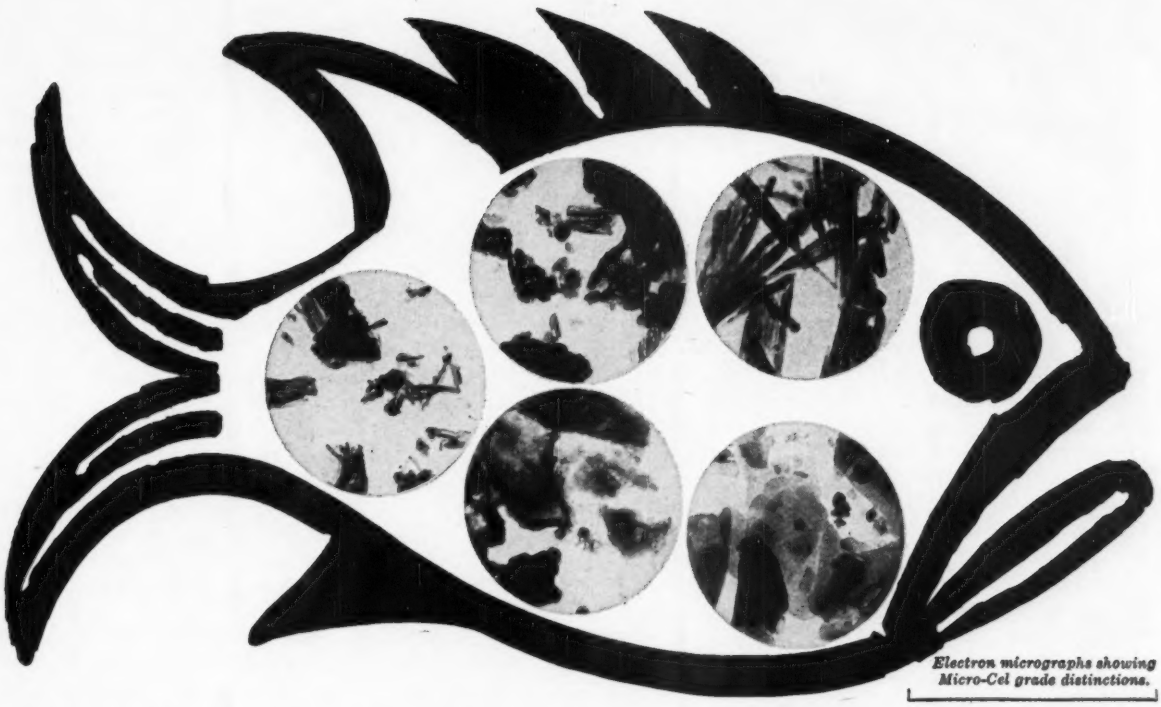
Vial says another advantage of Pronar is its low cost. Projected cost would be about $1 to treat 100 lbs. of butyl vs. about $1.85 with Elastopar.

Vial points out, however, that development is still under way at certain tire companies and more information is necessary before the compound becomes commercial.

Other Ingredients: There's much more to the butyl recipe than the promoter, of course. Butyl tire carcass stock may include carbon black, zinc oxide, *p*-hydrocarbon-substituted phenol-formaldehyde resin, a pentaerythritol ester of a purified rosin (modified with maleic anhydride), solvent, sulfur, tellurium diethyldithiocarbamate, and benzothiazyl disulfide, besides the promoter. Such complex systems make it difficult to establish the precise mode of action of the accelerator, a subject that is getting some basic research. Cyanamid, for example, is using radioisotopes to help track the chemical behavior of accelerators.

There's still no general agreement on a theory of accelerator action. Without the accelerator, vulcanization of rubber with sulfur is a slow process, so there's a possibility that the accelerator either catalyzes the vulcanization or furnishes free radicals to remove hydrogen atoms from rubber molecules, initiating chain reactions between sulfur and rubber. There are other theories.

It's a fact, however, that only rubbers of broad commercial importance are subjects of research by all accelerator manufacturers. Curing formulas for specialty elastomers are generally left to the elastomer manufacturer. That's because the potential market volume of additives is amall. Du Pont, for example, had to work out the additives to use with the firm's Hypalon and Viton (*see table*). Fortunately for Hypalon (which, untreated, cures only slowly in air), it



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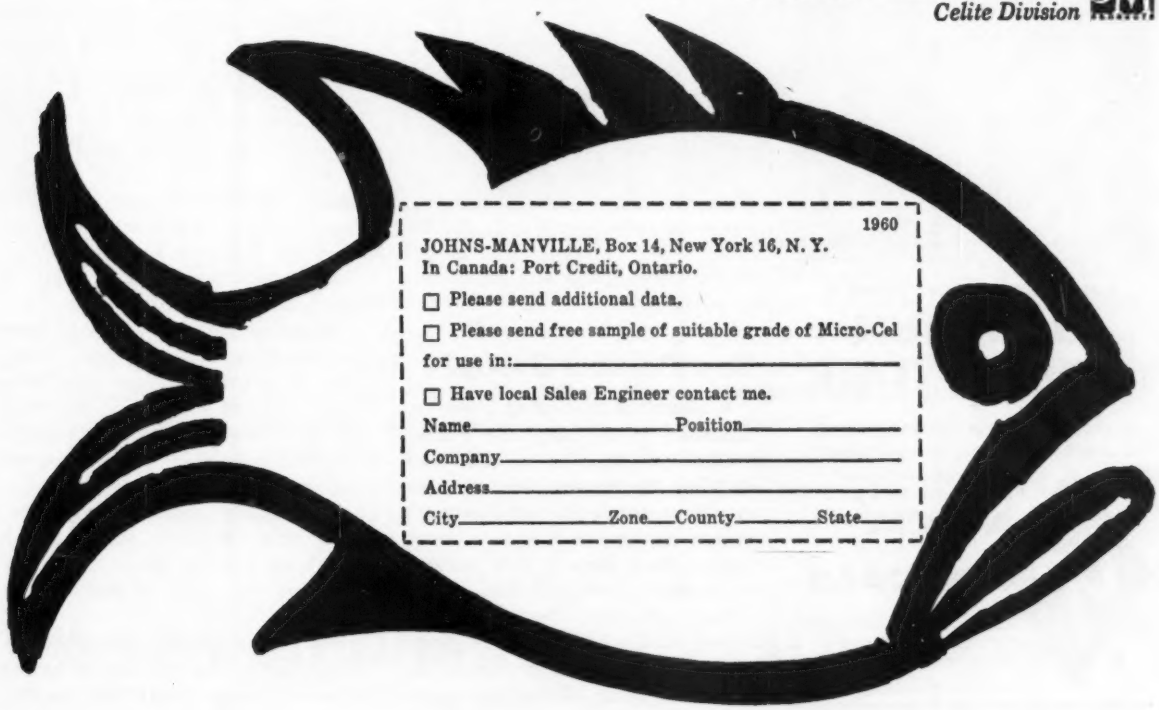

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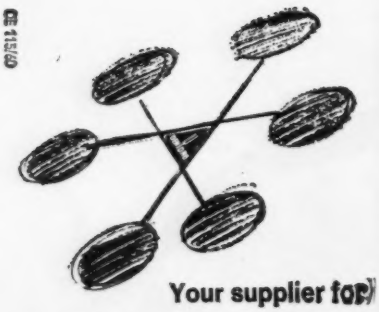

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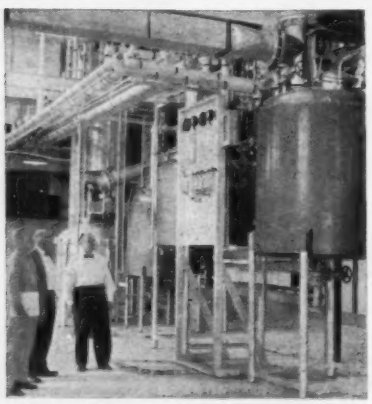

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can be cured with dipentamethylenethiuram tetrasulfide, one of the standard accelerators, which is also used with natural rubber, reclaimed rubber, and natural and SBR latexes.

Similarly, Hercules Powder is researching vulcanizates of ethylene-propylene elastomers it hopes will find use in tires, belting and wire coating. When and if the sales volume of such elastomers rises sufficiently, outsiders will probably become interested in supplying the necessary additives. With others, Minnesota Mining and Manufacturing has recently worked on vulcanizates of a copolymer of trifluoronitrosomethane-tetrafluoroethylene.

Challenge to Chemicals: Besides competing among themselves, rubber chemicals may soon be challenged by radiation as a vulcanizing agent. New research by Goodyear Tire & Rubber indicates that natural rubber latex can be commercially irradiated with cobalt-60 to give it useful properties. In the past, irradiation of natural rubber, butadiene-styrene, butadiene-acrylonitrile copolymers, and neoprene has looked promising but expensive. Goodyear says its method is "practical and economical," can be easily accomplished on a commercial scale and substantially increases tensile strength. Additives, such as methyl methacrylate and a high-styrene resin latex, added to the natural rubber latex prior to irradiation (doses of one to 20 megarads were used) improved the compression characteristics of foam rubber made from the irradiated latex.

Chemical systems, meanwhile, are getting continuing research as rubber processors strive to cut costs and improve quality. New accelerators that help accomplish this aim are sure to be in demand.

New Plastics Group?

A committee advocating a new organization to be called the Plastics Institute of America is this week analyzing the returns from an industry-wide survey to find out how much support the proposed institute would receive. Next step: a firm decision on whether to establish PIA.

The committee, lead by Louis Rahm, director of Princeton University's plastics laboratory, stresses the importance of an independent agency that can serve all segments of the plastics industry—suppliers, converters and customers—with research, educational and information services. The Society of the Plastics Industry decided in '58 that such activities were not within its scope.

After carefully laying the groundwork of the idea, the committee started publicizing its aims early this year (with the help of an $8,000 grant from the Society of Plastics Engineers), followed up with two questionnaires to the industry. The first asked each company about its research needs and whether the proposed institute would be helpful to them. Results: 77% of the respondents said they required research and 65% said their research problems were of a type that could be handled by the institute.

How Much Support? Then the next questionnaire was mailed, asked the make-or-break questions: "Do you favor the establishment of an American plastics institute?" and "Would you recommend that your company support the program of such an institute . . . by paying an annual membership fee ($250-5,000) based on your annual plastics dollar volume of business?"

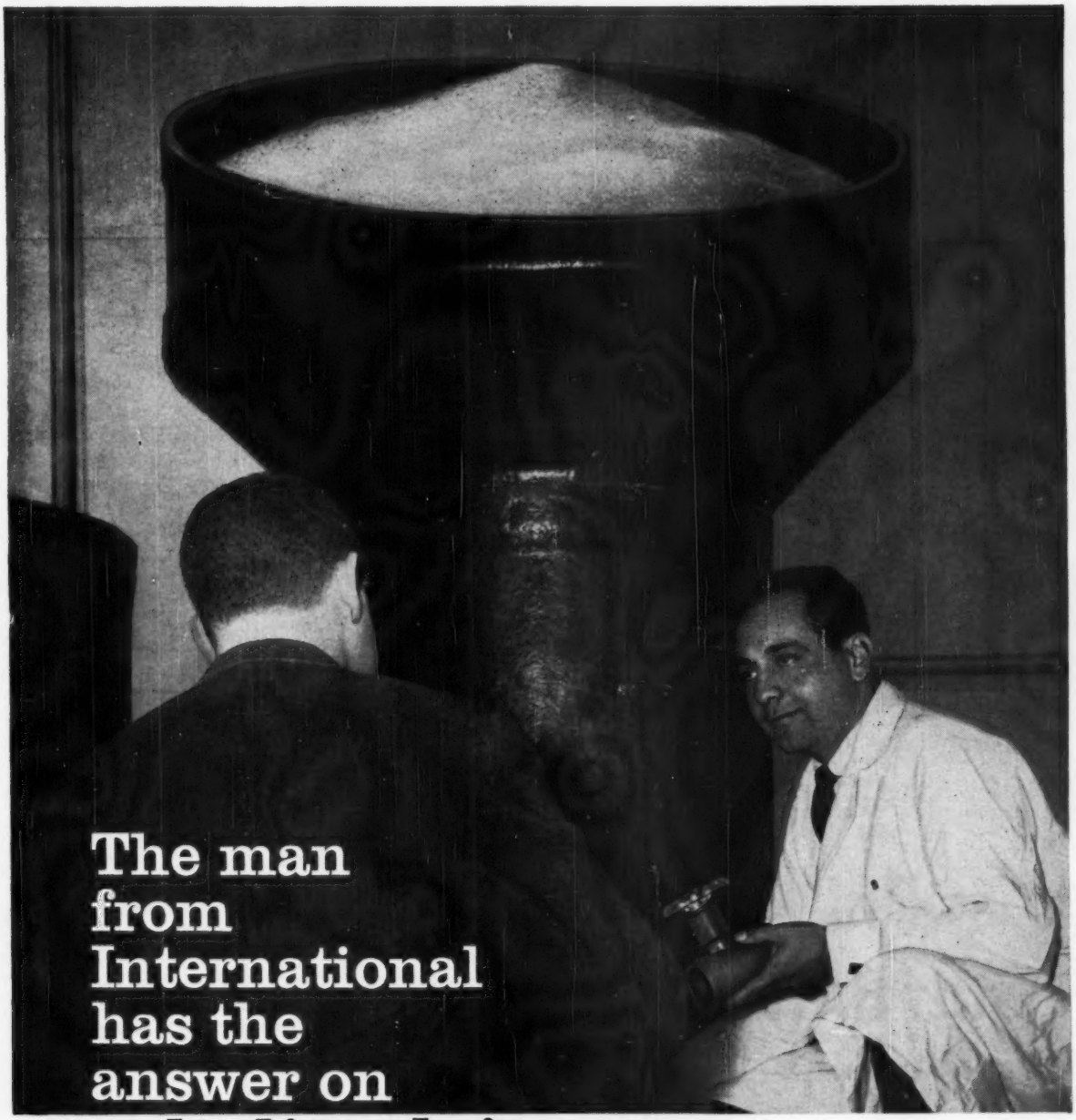
The committee is now evaluating the returns from the latter questionnaire, will use them as a basis to decide, probably by the end of October, whether to go ahead with the project.

Yes and No: Best bet at the moment is that the institute will come into being, but without the support of the largest plastics suppliers. Du Pont, for instance, says it has answered the questionnaire negatively, based on its opinions that there's now adequate research and that educational opportunities are growing in the field of plastics.

Hercules has also turned down participation in the institute, saying that it "would duplicate the company's present activities in the fields of basic research, product and equipment development and personnel training."

A large, plastics-producing oil company tells CHEMICAL WEEK that it hasn't yet returned the questionnaire, but that the reply is likely to be negative.

Rahm's enthusiasm isn't noticeably dampened by the prospect of having some big names missing from the pro-



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posed institute. He says the returns have indicated support from a broad cross-section of companies in all branches of the plastics industry, even though this cross-section does not hold for all dollar-volume categories.

Geared to Members' Needs: Rahm points out that activities of the institute will naturally be geared to the needs of the membership. If a large number of small companies require a centralized basic research program, the institute could provide it. And if companies in consuming industries need better standards and impartial quality-control testing, they could be obtained through TIA.

Estimates of the amount of money needed to set up the organization vary from $100,000 to $500,000. Even if the membership is composed only of firms with annual plastics volume under $1 million, the $100,000 figure might be raised by 200 such firms.

Judging from the vocal interest of a number of companies that stand to benefit from such an agency, the Plastics Institute would likely find more than minimum support.

Atomic Power for Space

A nuclear power plant the size of a watermelon is under development at General Electric Co.'s Atomic Power Equipment Dept. (San Jose, Calif.).

The unit can generate 5-30 kw. of electricity directly from the nuclear heat, and units can be combined to boost capacity to 300 kw. It consists of a self-regulating reactor that radiates heat at over 3100 F into a thick-walled graphite cylinder that has thermionic devices imbedded in its outer edges.

Designed for use in space vehicles, it's claimed to have a better weight-to-power ratio and efficiency, longer life, and higher power output than conventional batteries or solar cells.

In another approach to providing power in space, National Research Corp. (Cambridge, Mass.) is developing a new type of solar energy converter that's expected to have a weight advantage over conventional silicon cells. The Air Force has just awarded a $52,990 contract to NRC for a year's study of the new converter, which is based on research by Cornell's Thomas Gold, an NRC consultant.

EXPANSION

- The General Tire & Rubber Co. is building a $2.5-million tire test center near the company's research center in Mogadore, O. Equipment will include a new dynamometer that can test tires at loads up to 100,000 lbs.
- The Martin Co. (Baltimore, Md.) will build a laboratory to make curium-242 for use as the heat source in small auxiliary power generators.
- The Army will build a $1.8-million food irradiation research facility at the Quartermaster Research and Engineering Center in Natick, Mass.
- Monsanto Research Corp. (St. Louis) is a new, wholly owned subsidiary of Monsanto Chemical Co. It will conduct special scientific and technological research programs for the government.
- The Kaiser Refractories & Chemicals Division of Kaiser Aluminum & Chemical Corp. is constructing a technical center at Mexico, Mo. The new center will develop fireclay, silica and high-alumina refractories in the form of brick, mortars, castables, or ramming mixes.
- Rea Magnet Wire Co., Inc., a subsidiary of Aluminum Co. of America, will carry out research on insulation materials in a new laboratory near Fort Wayne, Ind. Completion of the building is planned for '61.
- Pfaudler Permutit, Inc., has acquired AeroChem Research Laboratories Inc. (Princeton, N.J.) by an exchange of an undisclosed number of Pfaudler Permutit shares of stock. AeroChem is currently working on such projects as the burning mechanism of solid propellants, has government contracts of over $400,000.
- Tennessee Eastman Co. (Kingsport, Tenn.) has formed a new company, Eastman Research AG., a Swiss corporation with offices and laboratories in Zurich. Facilities will be ready for occupancy in early spring of '61. Projects will include basic research in polymer chemistry and physics, catalysis, and in synthetic organic chemistry.
- Foote Mineral Co. (Philadelphia) expects to occupy its new, $3-million research center near Paoli, Pa., next month.
- Pharmaceutical firm Irwin, Neisler & Co. has dedicated new research laboratories at 1800 East Pershing Rd., Decatur, Ill.

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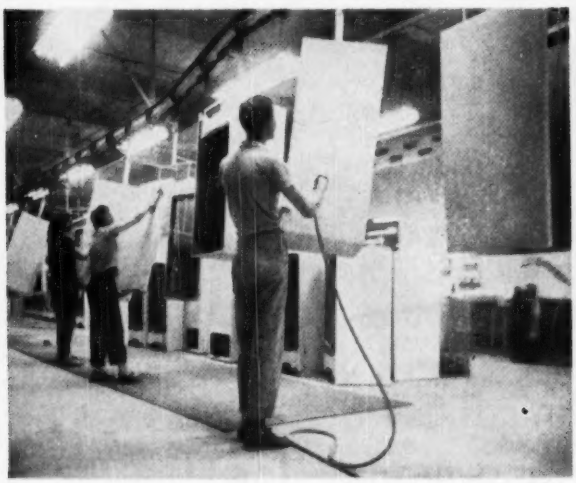

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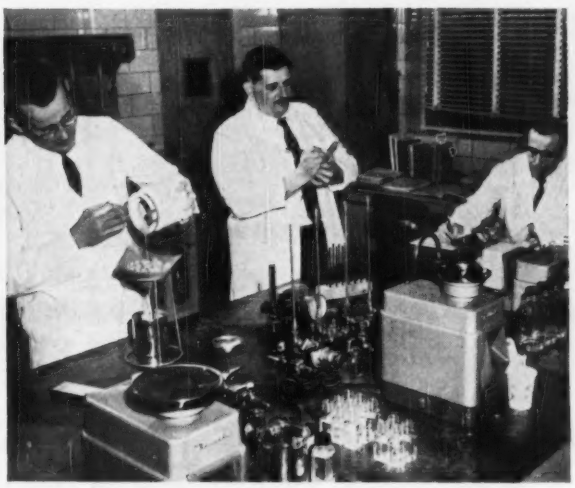

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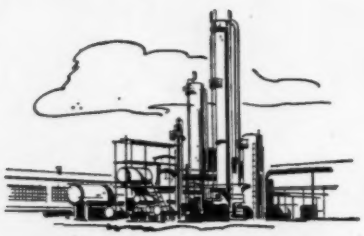

*This statement was contained in an engineer's report concerning the use of CO_2 as a coolant by a company that sulfunates straight chain alcohol. CO_2 sparged directly into the chemicals in the reaction tank, maintains a controlled temperature of -70° F or below. Total time for cooling *55 minutes . . . former time 3 to 4 hours.*

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CW PHOTO—ED WALLOWITCH

Checking starch coating are Morningstar-Paisley executives Morningstar, La Brie, Stempler and Lenz.

Stiffening the Outlook for Potato Starch

Workmen this week will put the roof on a new starch processing plant being built for Morningstar-Paisley, Inc. (New York), at Cary's Mills, in Houlton, Me. By January the $1-5-million plant will be turning out the first commercial-scale quantities (300 tons/month) of potato starch ethers to be produced in the U.S. Also scheduled for production: a number of other chemically modified potato starches. M-P's objective: to streamline the production of potato starch products and derivatives, make them more competitive with cereal and tapioca starches.

Potato starch, once the leading all-purpose starch in the U.S., lost its lead to cornstarch late in the 19th century, has never come near regaining it. About 10 times more cornstarch is now produced (about 2 billion lbs./year). Also imported specialty starches have come up in recent years as serious contenders.

Apple of Their Eye: What Morningstar-Paisley envisions is more-efficient operation of starch factories, more research into new products, use of once-discarded by-product materials. In short, M-P wants to do with the potato what researchers have done with corn.

Some progress has already been made in this direction—bulk of the work is being done in Europe—but M-P officials think much more can be done. They look, for instance, for more combinations of potato starch with synthetic resins, not only as extenders but also to give the compounds new sets of properties.

The Houlton plant is designed to handle 64,000 tons (768,000 bbls.) of potatoes each season—called a "campaign"—which runs from October to June. From this, and supplemental purchases of starch, M-P will turn out about 7,500 tons of potato starch and 10,000 tons of chemically modified items. To make the latter products M-P will need tank-car lots of ethylene oxide, sulfuric acid, caustic, liquid chlorine, soda ash and synthetic resins.

The Big Picture: The new plant, situated on a 52-acre tract near the Meduxnakeag River, will consist of a

potato starch extraction facility, a chemical treating plant, and a starch refining plant to produce food starches from tapioca and potatoes. A potato grading station will be built in the near future adjoining the plant, and long-range plans call for building a food processing plant to turn out instant and frozen foods. The company hopes to be able to buy raw-product potatoes by the acre.

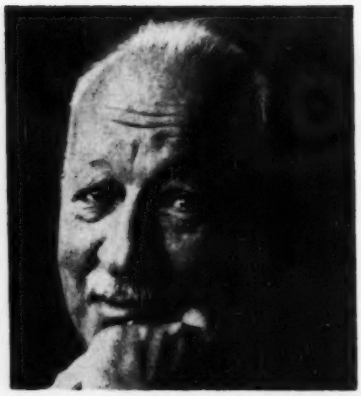
Starchier Diet: Potatoes now used for starch are generally obtained from the 15% of the crop unsuitable as tablestock. Now M-P hopes to use specially grown potatoes that have high starch content. This is done now in Germany and Holland, was once done in the U.S. but proved uneconomical then. Some 150 acres of high-starch potatoes are now being grown to determine current economics of the idea; it looks promising now, and 1,000 acres may be planted next year.

Besides seeking better raw materials, M-P is looking at postprocess materials—they now end up in the Meduxnakeag River.

Laurent La Brie, vice-president and general manager of the Starch Division, thinks that it's possible to convert into food ingredients some of the soluble sugars and proteins that now have to be discarded. The trick is to inactivate an enzyme that turns these soluble materials black. The enzyme can be inactivated now but not without impairing the food value of the material. Products to be turned out by the Houlton plant that may be chemically modified include starch ether (made under a Penick & Ford license), oxidized starches, cationic starches, dextrines, and copolymers of starch and synthetic resins. End-uses for these products will be about 60% in the paper coating field, 30% in textile applications and 10% for miscellaneous use.

Although the potato starch derivatives compete against generally lower-priced corn and tapioca starch derivatives, the inherent properties of potato-derived products — such as greater clarity, more stability, more resistance to flexing—enable them to compete.

Chemical Market Outlook: For the chemical producer, the potato starch makers, especially those in Maine, now offer little in the way of markets, but they could be sizable customers



Morningstar's Morningstar: Looking for more gravy from potatoes.

in the future. If the M-P investment pays off it might trigger the building of other larger, more efficient plants in the Maine area. In general most of the potato starch plants in that state are low-capacity (5-10 tons/day) operations, unequipped for any but simple chemical processing. Bigger plants would mean consolidation of smaller plants, into larger more versatile units that would use more chemicals. M-P itself, for instance, plans to eventually consolidate three smaller Maine starch plants at the new location.

Such a transition would change the Maine potato starch industry into one similar to that of Idaho. That state's first potato starch plant went up in 1940. It's now producing as much starch in its eight or nine plants (average production is around 30 tons/day) than Maine produces in about three times that many plants.

With an eye on the 2-billion-lbs./-year cornstarch market, M-P Board Chairman J. M. Morningstar is aiming to convert the spud, at least in M-P's operations, into a more glamorous raw material. With more research into processes and new products, it may well capture new markets.

The Meeting Season

Chemical specialties makers, both here and in Canada, will be convening soon.

The Canadian Manufacturers of Chemical Specialties Assn. meets in Montreal's Queen Elizabeth Hotel, Oct. 24-26 for its third annual convention. The group, formed in '58, is made up of both U.S. and Canadian companies, has the same major areas of product interest as the U.S.'s Chemical Specialties Manufacturers Assn. (CSMA)—i.e., aerosols, automotive specialties, desinfectants and sanitizers, pesticides, soaps and detergents and waxes and floor finishes.

CSMA will have its 47th annual meeting at Hollywood Beach Hotel in Hollywood, Fla., Dec. 3-9.

Also of interest to chemical specialties management is the upcoming 73rd annual meeting of the National Paint, Varnish & Lacquer Assn., to be held in Chicago's Drake Hotel Oct. 27-29. The Paint Industries' Show, at Chicago's Sherman Hotel from Oct. 29-Nov. 2, will run concurrently with the 38th annual meeting of the Federation of Societies for Paint Technology in Chicago.

AHA Approved List

The American Hotel Assn. (New York) is now taking applications for its 1961-62 certification listings of chemical specialties compounds.

The number of products has been expanded this year to include paper goods—e.g., towels, napkins and toilet tissues; mop treatment compounds; wax strippers; and a wider variety of paints. The new list will include only those products that have been certified as meeting newly set up specifications.

AHA's booklet, purpose of which is to provide purchasing agents with a guide to the cleaning and polishing compounds on the market, includes such items as abrasive cleaners; carpet cleaners; dishwashing compounds; floor, glass and furniture polishes; mothproofing compounds; paints; paper products; silver polishes; upholstery cleaners; and wax strippers.

Last year's guide was distributed to 23,000 members of organizations such as the American Hospital Assn., American Hotel Assn., National Institute of Governmental Purchasing, Assn. of College Unions.

Coatings Climbing

Paint, varnish, and lacquer sales during the first seven months of '60 totalled $1.2 billion, edging into a new record for that period. The figures, compiled by the Bureau of the Census, show an increase of ½% over the old record set in '59.

Trade sales (consumer goods) in the first seven months were $639.3

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(gms/100g solvent @23°C)

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Ethyl alcohol	54.4
Diethyl ether	0.5
Petroleum naphtha	insoluble
Methyl-ethyl ketone	9.4
Methyl-isobutyl carbinol	10.5
Mineral spirits	.03
Amyl acetate	3.8

M&T Chemicals

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million, 0.6% below '59's high, while industrial sales were $449.3 million, 2.1% higher. Paint and varnish sales of $332.1 million were 1.8% over the '59 mark and lacquer sales of $117.2 million were 3% higher.

Total production during the period amounted to 407.3 million gal. Trade sales accounted for 212.9 million gal., and industrial production 194.4 gal.

Total sales for the industry in July, the most recent month for which figures are available, were $159.5 million, second highest for the month. The July record of $166.7 million was set last year.

Drug Helps Healing

A new drug that promotes healing by enzymatic activity and reduces the length of time needed for medical treatment of surface wounds, ulcers and burns has been developed by Parke, Davis & Co. (Detroit).

The drug, marketed under the name Elase, contains fibrinolysin (derived from bovine plasma) and desoxyribonuclease, obtained from bovine pancreas. It will be available by prescription only—in ointment form for topical application and in dry form for use in solution.

Parke, Davis tests have shown Elase to be useful in treatment of inflamed mucous membranes associated with cervicitis and vaginitis. The drug also reduces the time necessary for preparation of a skin graft. For example, a surface ulcer normally requires up to 10 days of wet saline solution application before the skin is ready for grafting. Elase shortens the time to 48 hours. Second- and third-degree burns can be prepared for grafting within three to seven days, compared with 10 days to three weeks with existing methods.

Textile Chemicals

W. R. Grace & Co. (New York) has licensed Moretex Chemical Products, Inc. (Spartanburg, S.C.), to produce and market two hydrazinium compounds for use in textile wet processing. Aquazine-100 and Aquazine-88, are reported to be the first hydraziniums to be commercially produced for textile processing.

Aquazine-100 is described as a cationic softening agent for natural and synthetic fibers, which, unlike conventional softeners, can be successfully applied to yarns in a package dyeing machine. Grace believes it is the first effective cationic softener developed for use in napping, knitting, and wash-and-wear finishing. The compound is said to soften without reducing tensile strength, is nonyellowing, will not retain chlorine, intensifies colors and can be applied with optical whiteners from the same bath.

Aquazine-88 is an antistatic agent that may be used in the same processing systems as Aquazine-100. It is reported to enhance the antistatic properties of synthetic fabrics.

First with a Finish

An all-purpose clear finish claimed to be the first ever marketed nationally in the paint and varnish industry is now being introduced by Pratt & Lambert (Buffalo, N.Y.).

The new product (a urethane), called Varmor, is being marketed as a replacement for floor, spar and furniture finishes. Pratt & Lambert claims it's 100% more wear resistant than previously available floor finishes, 50-100% more resistant to weathering than spar varnishes.

The glossy coating is paler than conventional floor or spar varnishes, can be used over bare wood or over conventional stains or paste wood filler. Drying time is about 12 hours but wood coated with the finish may be walked on after 4½ hours, according to P&L. It's said to eliminate the need for floor and/or furniture waxing. Initially the product will be offered in gallon, quart and pint cans (price: $10.75/gal.) and in a 16-oz. aerosol ($1.75). Coating will be retailed through paint stores, lumber, building supply and hardware dealers.

PRODUCTS

Oil Field Specialty: Continental Oil Co. (Houston, Tex.) is marketing a new quaternary ammonium product for use in oil field secondary recovery projects. Adoquot, an addition to Conoco's line of oil chemicals sold under the Adomite tradename, is said to inhibit growth of harmful bacteria in oil well formations and to act as a corrosion inhibitor.

•

Drycleaning Chemical: Pennsalt Chemicals Corp. (Philadelphia) has expanded its line of drycleaning chemicals with Super-Karb, a new superadsorptive activated carbon said to be high in solvent clarification. The product is reported to have good ability to remove dyes and fatty acids and to control buildup of color. It is packaged in 1-lb. polyethylene bags.

•

New Surfactants: Beacon Chemical Industries (33 Richdale Ave., Cambridge, 40, Mass.) has developed a new series of long-chain modified organic polyphosphate concentrates called Phosphonols. In the form of the acid polyphosphate ester, they are available at 98-100% activity, are alkali-soluble and are said to withstand hydrolysis in boiling dilute caustic soda. Suggested applications: general-purpose cleaners, industrial cleaning compounds, antistatic agents, pigment dispersion, aircraft cleaners.

•

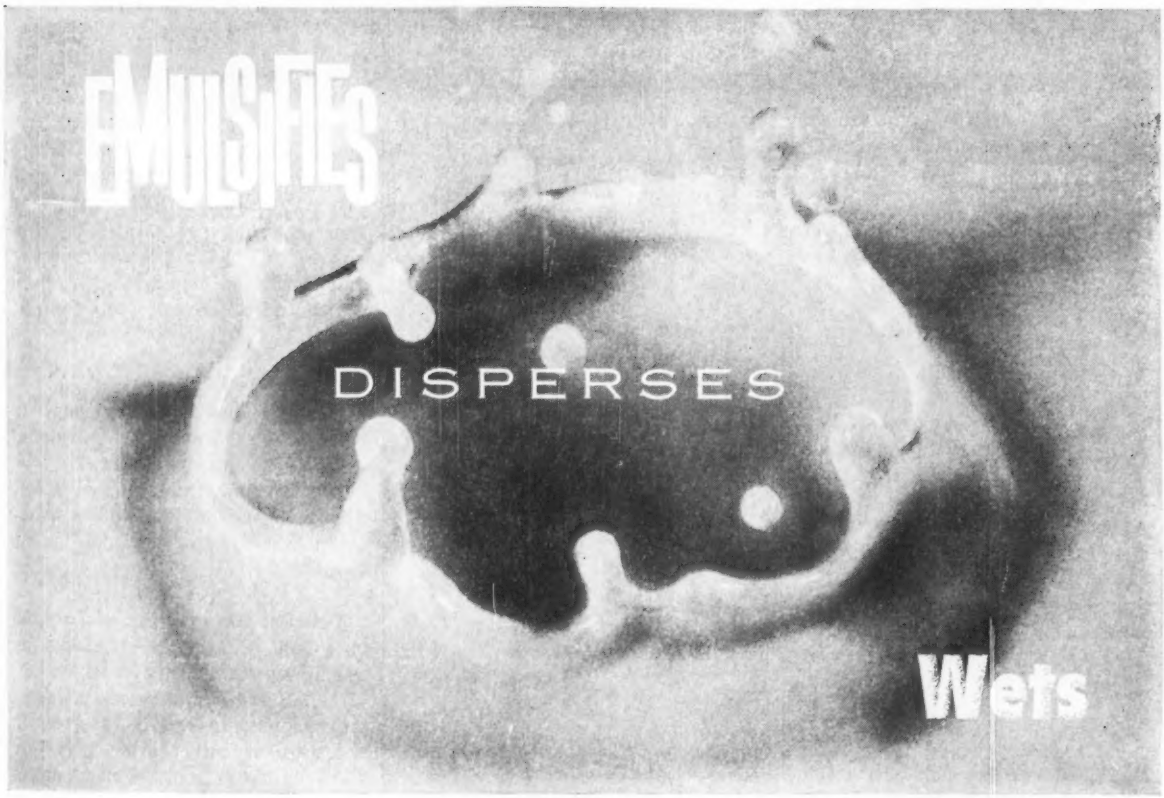
Dextrins Series: A line of cold-water-soluble dextrins has been developed by A. E. Staley Manufacturing Co. (Decatur, Ill.). They are said to provide more uniform and stable viscosity, light color, and ease in preparation for a wide variety of adhesives applications. The dextrins, marketed under the name Koldex, are made by formulating regular specification dextrins with borax, preservatives and defoamers into a liquid adhesive, which is then spray dried. The product is packed in 50-lb. polyethylene-lined, multiwall paper bags.

•

Fuel Additives: Ethyl Corp. (New York) is offering commercially two additions to its line of fuel and lubricant additives. Ethyl Antioxidant-ZDP, when added to lubricating oil, acts as an antioxidant and a mild extreme-pressure additive, which protects engines against cam and lifter wear. Ethyl Metal Deactivator, a chelating agent, is added to gasoline, jet fuels and distillates to counteract harmful effects of copper on fuels.

•

New Aromatic: Givaudan-Delawanna, Inc. (New York), will bring out a new aromatic chemical called Sandela GD, which is reported to have the characteristics of natural sandalwood oil. The polycyclic alcohol will be available in commercial quantities at a cost one-third less than that of natural oil. It is recommended for soaps, detergents, cosmetics.



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EMULPHOR VN-430
is an **oil-soluble** liquid that tends to form stable W/O and fast-breaking O/W emulsions. It is particularly valuable in the pesticide industry as a component of dormant and summer spray oils and in leather processing for degreasing pickled skins.

EMULPHOR EL-719
features **low toxicity,** so much so that it is used to emulsify pharmaceutical materials. On the other hand, in urethane foam manufacture, this liquid emulsifier promotes the formation of uniform bubbles. As a post stabilizer for pigmented latex systems, it inhibits "prefloc."

EMULPHOR EL-620
also a liquid, is a good all-around emulsifier that has essentially the same properties and applications as its homolog, Emulphor EL-719. However, it differs in hydrophobic-hydrophilic balance and also in that it is **anhydrous.**

EMULPHOR ON-870
is **stable to strong acids and alkalis** and is therefore used in acid degreasing of wool. It is outstanding as an emulsifier of waxes. It is also valuable in emulsion polymerization and in post stabilization of latices.

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80 Pine St., New York 5, N. Y. WHitehall 3-5600

SPECIALTIES

Wax Stripper: Fuld Bros. (Baltimore, Md.) is marketing a new wax stripper called Quick-Strip Wax Remover, which has been formulated to perform at a 32-to-1 dilution. Fuld says its new product will also remove water-resistant waxes, plastic and polymer finishes, petroleum or water bases, paste and liquid waxes without mechanical scrubbing. Quick-Strip is available in plain or ammoniated form.

•

Quaker's Quota: Quaker Oats Co. (Chicago) will join the powdered weight reducing market (*CW, Sept. 24, p. 59*) with Quota, a low-calorie diet food. The product will be available in vanilla, chocolate and banana flavors.

•

Cellulose Carrier: American Viscose Corp. (Philadelphia) is marketing a pure form of cellulose, which absorbs fats and oils. Odorless, tasteless, and colorless, Avicel is expected to find its main market in the food field —for custards, peanut butter, dressings—and in cosmetics and pharmaceuticals.

•

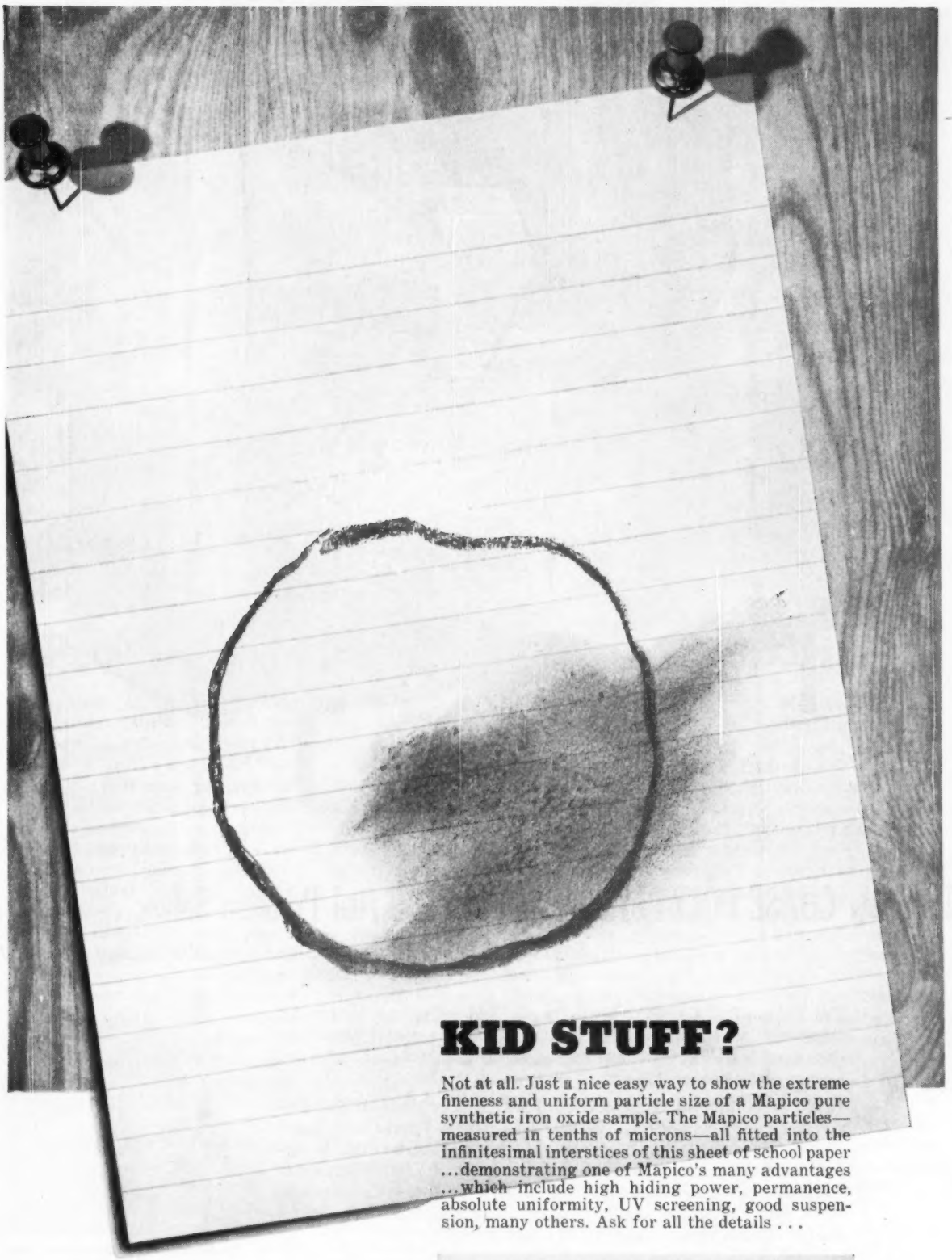
Toxic Solvent Dispenser: A dispensing can for toxic solvents has been developed by The Protectoseal Co. (1920 Western Ave., Chicago). The can holds ½ pt. of solvent, has a spring-loaded plunger assembly that prevents the solvent from escaping into the atmosphere.

•

Men's Spray Deodorant: Gillette Safety Razor Co. (Boston, Mass.) has begun national marketing of an aerosol deodorant claimed to be the first exclusively for men. A 3-oz. metal can of Right Guard sells for 89¢. The product, which had been tested in 12 Western states for six months, is the first in a series of toiletries the company intends to introduce.

•

Licensing Laxatives: The Italian pharmaceutical firm of Prunetta (Via Bardonecchia, Turin, Italy) has developed a new process for the manufacture of laxative-incorporating fruit gelatin drops. It has also developed a machine that can turn out 100,000 individually wrapped drops daily. The firm hopes to license the machine and the process to U.S. companies. Prunetta now turns out the laxative in Italy under the company name.



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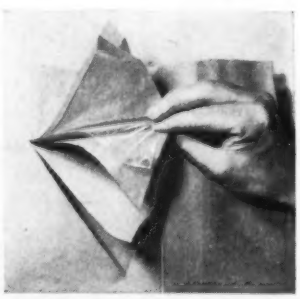
If you package moisture-sensitive products—such as sugar, chemicals or fertilizers—this new bag can be a problem solver for you, too. It is now available in 25-, 50- and 100-pound sizes. Call your Chase representative for full information.



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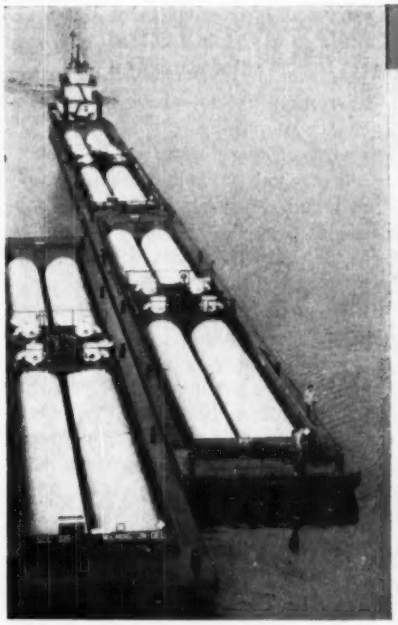


Furor Over Waterway Tolls: Mounting to a Boil

- **Waterway proponents last week firmed up their "battle plan" to ward off the threat of tolls.**
- **Many CPI shippers have joined in demonstrating strong opposition to tolls on the inland waterways.**
- **Coming soon: biggest flood yet of antitoll messages intended to rally public opposition to waterway tolls.**
- **Outlook: a bitter fight with a good chance that some kind of toll will win next year or the year after.**

CPI Mobilizes for Waterway Toll Battle

The highly controversial question of tolls on America's free inland waterways, after simmering quietly for years, is about to come to a violent boil again. Last week the organization committee of the newly reconstituted National Waterways Conference met in Chicago to complete plans for a vigorous battle against proponents of waterway tolls. Next week, on Oct. 12, the group's general membership—including several CPI traffic men—will gather again in Chicago to kick off the aggressive antitoll campaign.

NWC is rallying against waterway toll proposals of all kinds—proposals that have lately sounded attractive to many legislators. Object: to convince U.S. Congressional leaders—and the public—that tolls on the nation's free waterways will harm the nation as well as the water carrier industry and its customers.

Antitoll advocates have paid particular attention to underscoring the chemical process industries' stake in low-cost water transportation:

- CPI use of waterways has burgeoned in recent years, with many companies building near or on waterways, operating their own barge fleets and taking advantages of rail rates kept low by threat of water competition.
- Tolls designed to recover federally underwritten operating and maintenance costs could boost water shipping costs—toll foes say by as much as 20-40%.
- Tolls aimed at recovering full federal investment in inland waterways might hike water shipping costs as much as 75-100%.

Fighting Tolls: The National Waterways Conference is not a new organization (it was formed in '55 after the release of the Hoover Commission report on water resources and power, which proposed waterway tolls). But it is now seeking to reorganize on more effective lines. Until now the conference has been a confederation of trade and development associations, formed on a contributory basis to support and coordinate opposition to waterway toll proposals. Moreover, the group has never acted under its own name. Now it is setting up on a membership basis (for stronger financial support), with three wings of waterway interests: water carriers, trade and development associations and shippers. CPI representatives include L. P. Nelson of Olin Mathieson Chemical Corp. (New York) and G. J. Derrick of Phillips Petroleum Co. (Bartlesville, Okla.).

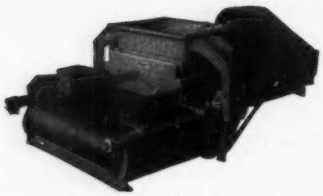
Antitoll Programs: Crux of the NWC antitoll effort will be what the group calls "research and related activities." The research they propose is designed to find out the costs of various toll proposals to the water carrier industry and ultimately to industries and consumers. First on the agenda: an analysis of the impact of waterway tolls on oil transportation costs. Reason: petroleum and related products constitute over 35% of all inland waterway traffic—the biggest single chunk of inland water movements of any commodity.

The conference proposes a "militant program." It intends to give the results of these analyses (and other information) to government leaders and to the public in the most effective way, and it's retaining a public relations firm to help do it.

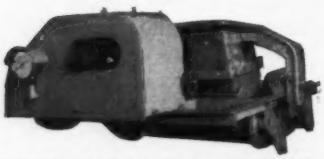
Here's how their messages sound:

- Tolls—no matter how small—will drive away some water traffic.
- Once this happens, toll charges will likely be boosted to regain lost revenue. Most probable result: loss of still more water traffic.

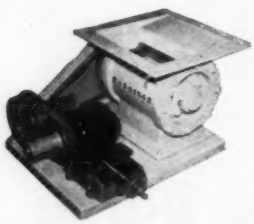
HARDINGE REGULATING FEEDERS



CONSTANT-WEIGHT FEEDERS

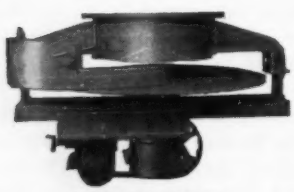


WEIGHT-MEASURING FEEDERS



VOLUMETRIC NON-FLOODING DRUM FEEDERS

VOLUMETRIC BELT FEEDERS



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(See our complete process equipment listing in Chemical Engineering Catalog, page 362-363)

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• Result: weakening and eventual extinction of the inland water carriers, loss of a valuable national defense asset, dependence on other more costly transportation and eventually pressures for higher prices.

Gauging the Threat: Most chemical companies checked by CHEMICAL WEEK indicate strong interest in the toll question. Reasons: many firms have substantial investments in waterside plant sites, docks and handling facilities and barge fleets; many others are concerned about the prospects of waterway tolls—not because of the higher barge costs they may produce but because they fear that some of the low rail rates they now enjoy may be boosted if the threat of low-cost water transportation is ever diminished.

This is not to say that chemical traffic on the inland waterways is not important or growing. This year some 15 million tons of industrial chemical cargoes will move over the nation's 29,000 miles of rivers, canals and lakes. Chief items: sulfur, sulfuric acid, caustic soda, benzene, fertilizer materials, alcohols, ethylene glycol and compressed gases.

Moreover, chemical traffic on the inland waterways is gaining faster than traffic of most other commodities. Example: chemical traffic on the Ohio River gained a whopping 38% in '59 over '58—from 2.1 million tons to 2.9 million—while over-all traffic volume netted a 10% advance.

Lack of Agreement: But despite this strong interest in tolls there is little agreement among top industry traffic men on just what will come from the heated battles expected in coming months. They differ on several pivotal questions:

(1) How likely are tolls? Some contend that NWC's effort will beat down any toll proposals brought up during the 87th Congress. Others figure that some sort of tolls on the inland waterways are inevitable—if not in '61 then perhaps in '62 or '63. Their reason: water carriers and shippers should help pay for operating and maintaining the waterways, costs now borne by U.S. taxpayers.

(2) What form will a prospective toll take, and how high will it or should it be? Proposals made recently have embodied either a tax on fuel used by barge operators—reportedly at 300% of the fuel cost—or a direct user's charge of approximately 2 mills per ton-mile (one ton of cargo moved one mile). Nearly all chemical traffic men believe that the railroad-inspired toll proposals to make water carriers and shippers pay the full costs of all waterway improvements—whether for navigation or not—have almost no chance of passing.

Instead, many traffic men believe a toll of about ¾ mills/ton-mile would be a fair toll level. This was the toll proposed by the Hoover Commission in '55, with the intent of recovering just operating and maintenance costs from users, not full capital investment in the waterways.

The biggest question, however, revolves about the impact that prospective tolls may have on the CPI. There's little doubt that any toll (no matter what the size) will force some CPI traffic off the waterways—i.e., some petroleum products to pipeline, many chemicals to rail. But there are too many unanswered questions at this stage to judge this one accurately.

Some will be cleared up at the coming meeting; still others will be asked. In any case, the National Waterways Conference will turn a big spotlight on an issue vital to the CPI.

Efficiency Boosters

Air Reduction Sales Co. this week is in the midst of a dual effort to boost sales efficiency of its field representatives as well as of its distributors and their employees. To its dealers, Airco is sending out the second wave of quizzes in a distributor education program—which has stirred strong interest among dealers. For its own salesmen, Airco is footing the bill for a series of technical correspondence courses.

Airco has long wondered how to get its distributors' employees, including even telephone operators and floor sweepers, to become acquainted with the products and equipment in its big (120-page) catalog. The solution: a series of five 30-minute quizzes that can be answered by reading through the catalog. Those who complete all five will receive their choice of gifts of kitchenware. A sweepstakes drawing at the end of the contest, about Dec. 1, will award larger prizes such as television sets, watches and radios.

This is the first such contest Airco

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If you'd like to see a practical application of our unique service in action in *your* plant, write, phone or wire us by our new name—*Pittsburgh Chemical Co.*—and watch things happen—*for you!*

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as attempted and is open only to thorized dealers and their employ-s. The idea came from a similar peration that has been used by Corn-g Glass Co.

So far, contest entries have rolled in from 417 of Airco's 660 U.S. distributors. Just before the kickoff Airco estimated that about six distributor employees per organization might enroll; the number has held closely to that figure, giving a total of over 2,500 distributor employees vying for Airco's prizes.

The original budget of $15,000 was based on an expected turnout of 1,500. Although the final cost will be higher—Airco isn't sure how much—this is a reasonable sum for 2½ hours of distributor education, according to A. V. Scherer, advertising and sales promotion manager. Paper work is the biggest problem encountered. The first mailings were handled by an outside firm, but Airco recently installed additional shelves to take care of the replies itself.

Distributor sales are especially important to Airco. They amount to roughly 30% of Airco's $110-million annual sales volume from industrial gases and welding equipment. These products contribute over one-half of the corporation's sales volume. Moreover, Airco has long wanted to pull its distributors closer to the company's activities, feels they have been too isolated. Its sales management interprets the enthusiastic response to its contest—as well as specific comments on it—to mean that distributors like this more personal approach.

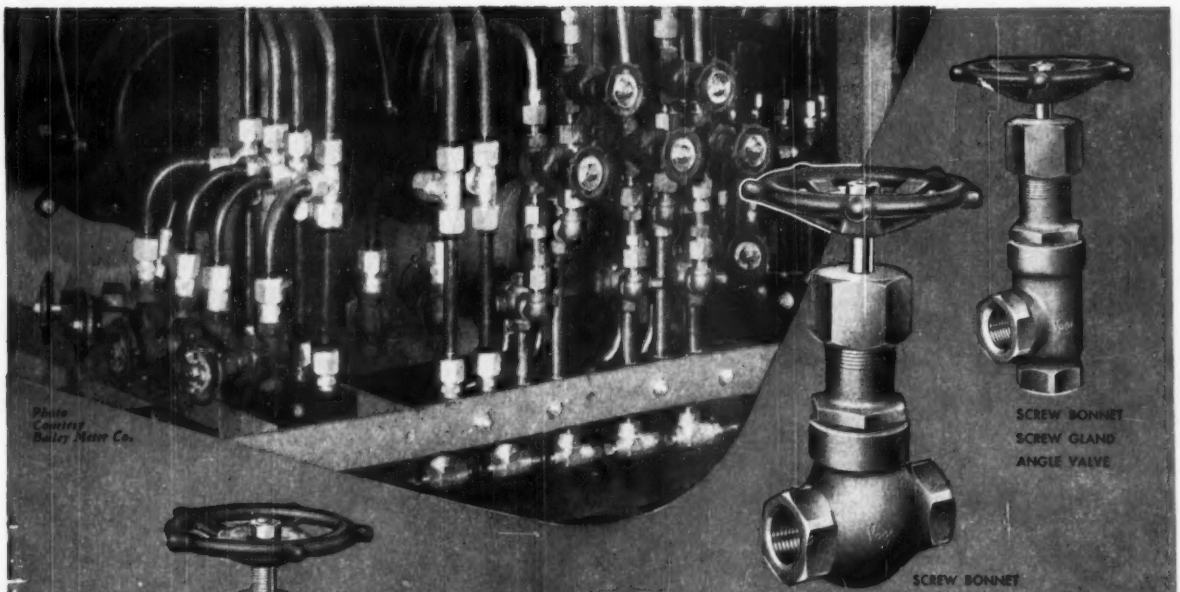
Salesmen, Too: Airco's own salesmen are also responding strongly to the company's current sales development program. The plan inspires the sales staffers to brush up on fundamentals by taking technical correspondence courses. The budget for this plan is $18,000, covering some 300 applicants. Subjects range from elementary chemistry to inert-gas-shielded arc welding. International Correspondence Schools (Scranton, Pa.), which handles the arrangements, also gives a diagnostic test to each applicant to determine the courses he needs.

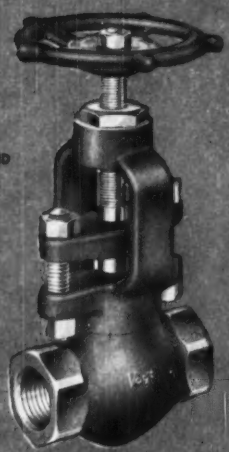
Plans are under way for a similar Airco-ICS program for distributors. It will cover such areas as store organization, sales management, accounting, advertising, truck routing, and budgeting. This plan is tentative, but the technical courses are already available for distributors at their own expense.

While it's too early to determine how successful these sales-staff development efforts will be, Shelton Stone, Airco's sales training director and distributor contest manager, figures the dividends of improved product knowledge and new enthusiasm will be more than worth the price.

DATA DIGEST

- **Company Products:** Revised list catalogs more than 600 commercially available chemicals. Aceto Chemical Co., Inc. (40-40 Lawrence St., Flushing 54, N.Y.).
- **Surfactants:** New brochure tabulates physical properties of nonionic surface-active agents. Listed characteristics of the alkylphenoxy polyethoxy ethanol (APPE) compounds are solubility, viscosity, surface and interfacial tension. Uses include wetting agents, detergents, emulsifiers and penetrants. Agricultural and Sanitary Chemicals Dept., Rohm & Haas Co. (Philadelphia 5).
- **Lignosulfonates:** New bulletin (No. 130) describes dispersing, binding and chelating activities of these water-soluble, anionic, surface-active derivatives of lignin. Charts list typical analyses and physical characteristics of different polymers. Marathon Division, American Can Co. (Menasha, Wis.).
- **Pallet Handling:** Handbook describes wood and metal pallets, their uses, advantages and specifications. Loading instructions are given and standard loading patterns illustrated. The Raymond Corp. (56-184 Madison St., Greene, N.Y.).
- **Edible-Oil Transportation:** Bulletin outlines method of protecting the purity of edible oils during shipment. Procedure consists of coating the tanks containing the edibles with white mineral oil. Sonneborn Chemical and Refining Corp. (300 Park Ave. South, New York 10, N.Y.).
- **Rubber Curing Agent:** Brochure discusses the use of methylol derivatives of para-substituted phenols for vulcanizing rubbers. Subjects covered: catalysts employed, resin performance data and specifications, and shipping and storage conditions. Catalin Corp. of America (New York).





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L-50	516 "
L-100	1,040 "
H-25	255 @ 210° F.
H-35	375 "
H-50	540 "
H-100	1,070 "
H-300	3,000 "
H-1500	15,000 "
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AMOCO CHEMICALS

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910 South Michigan Avenue
Chicago 80, Illinois

Market Newsletter

CHEMICAL WEEK
October 8, 1960

More phthalic anhydride capacity is on the way. But it will be cold comfort to phthalic customers who are getting 40-60% of their demands.

Two as-yet-unannounced plants are under construction. Hatco Chemical Division of W. R. Grace won't talk about it, but is known to be building a phthalic plant, probably a fluidized unit built by Badger. It's a big one, too, probably in the 50-million-lbs./year class. Site: Fords, N.J.

Thompson Chemical Co. (Pawtucket, R.I.) is putting up a smaller unit. The firm says only that it has a plant under construction. It is also believed to be a Badger, fluid-bed unit. Probable capacity: 10 million lbs./year.

Kolker Chemical, which shelved an earlier project to make phthalic, reportedly is seeking money for a plant. Says hard-to-predict Lee Kolker, however: "We have no plans at all for a phthalic venture now. We're concerned with our new caustic-chlorine plant."

U.S. phthalic capacity is probably 510 million lbs./year. The two new expansions on top of others previously revealed should push the figure close to 800 million lbs. It's practically impossible to gauge demand right now because producers are not able to operate anywhere near capacity. But it is certainly less than 400 million lbs./year, is not expected to reach 450 million lbs. before '65.

Meanwhile, October will be the worst month for phthalic customers (*CW Market Newsletter, Oct. 1*). Producers, who normally can work off a naphthalene inventory, are living hand-to-mouth. Imports have all but dried up because foreign phthalic production and demand has been soaring. (One producer has had quotes for imported naphthalene as high as 18½¢/lb.)

Help may come in the first quarter of next year when petroleum-naphthalene plants come in. Ashland is due to start up late in February. But petroleum-naphthalene is a brand-new venture, and it's realistic to look for startup difficulties and delays. Best bet now: it will be no earlier than the second quarter—and more likely the third—before phthalic producers (and users) are out of the woods.

Ironically, more orthoxylene is on the way, but that won't help either. Long-time producer of phthalic from *o*-xylene, Oronite, is having no trouble. But its capacity (estimated at 18 million lbs./year) is a drop in the over-all bucket. Newcomer Amoco (with 15 million lbs./year) doesn't help much either. In addition, it's still believed to be having trouble with its plant and not approaching capacity.

Normally, fixed-bed producers using naphthalene could switch to *o*-xylene, although at a sacrifice of throughput. Some (Allied, Mon-

santo) are using some ortho now. Trouble is that at least 80% of the country's ortho capacity (*CW* estimate: 95 million lbs. this year) is committed to the overseas market, where it has won wide popularity as a source of phthalic.

This capacity will be tripled next year when plants under construction are complete. Moreover, a new producer will shortly reveal plans for a 22-25-million-lbs./year *o*-xylene plant, and a current producer is thought to have an 88-million-lbs./year plant under consideration.

But virtually all the new capacity is being built for the foreign market, too.

•

Explosion and fire ripped Dow's Bay City, Mich., polyethylene plant last week, injuring six persons and resulting in an estimated $100,000 damage. Cause has not been determined, but a blaze in the polymer plant flashed back into the reactor. The company does not say when the unit will be back in operation. But it does say that, due to good inventories and other sources of supply, it will be able to maintain deliveries of PE.

•

Alcoa will transfer chemical production from its East St. Louis, Ill., plant to Bauxite, Ark., and Point Comfort, Tex., plants within 18 months. Reason: the Illinois unit's inability to produce competitively.

•

West Germany's plastics and synthetic rubber capacity continues to mount. Chemische Werke Huels AG will expand its 50,000-tons/year PVC operation to 80,000 tons/year and build polystyrene output potential to 30,000 tons/year. Completion is expected in '61. Meanwhile, a 3,600-tons/year polypropylene plant will go into operation near the end of this year. The company will launch commercial polybutadiene production with a 20,000-tons/year plant.

•

Vietnam will spend $13.5 million for imports of pharmaceuticals in '60, $1 million more than last year, according to Nguyen Ngoc Tho, Minister for National Economy. Most of the increase will be for antibiotics, consumption of which is growing rapidly. In Saigon there are reports that some types of antibiotics are now in short supply. Construction of a pharmaceutical plant in Saigon is already under way by Specia-Rhone Poulenc. Completion is expected early next year.

During '59 the U.S. supplied 26% of Vietnam's drug and pharmaceutical needs. Its imports were financed through the U.S. State Dept.'s International Cooperation Administration commercial imports program.

Cambodia's imports of pharmaceuticals will be about $4.7 million this year. Both Sterling Drug and Squibb are actively prospecting for this traditionally French-controlled market.

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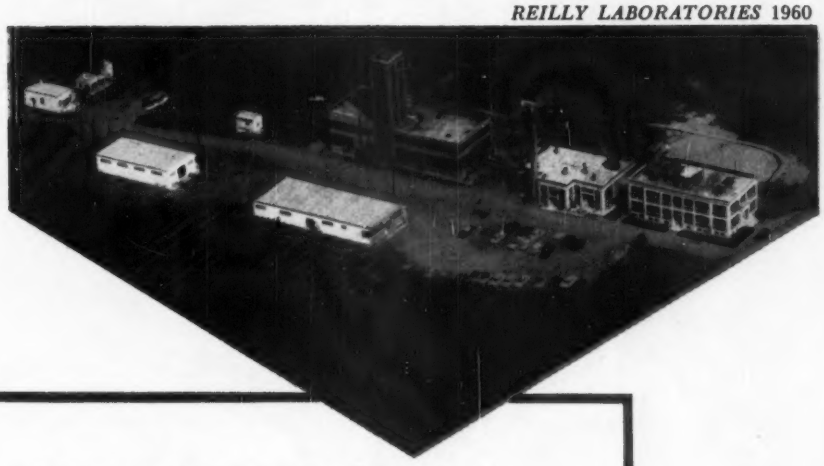
REILLY LABORATORIES 1960



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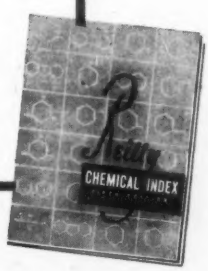

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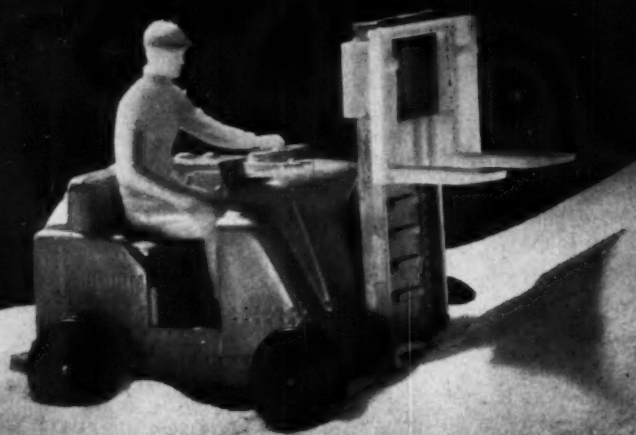

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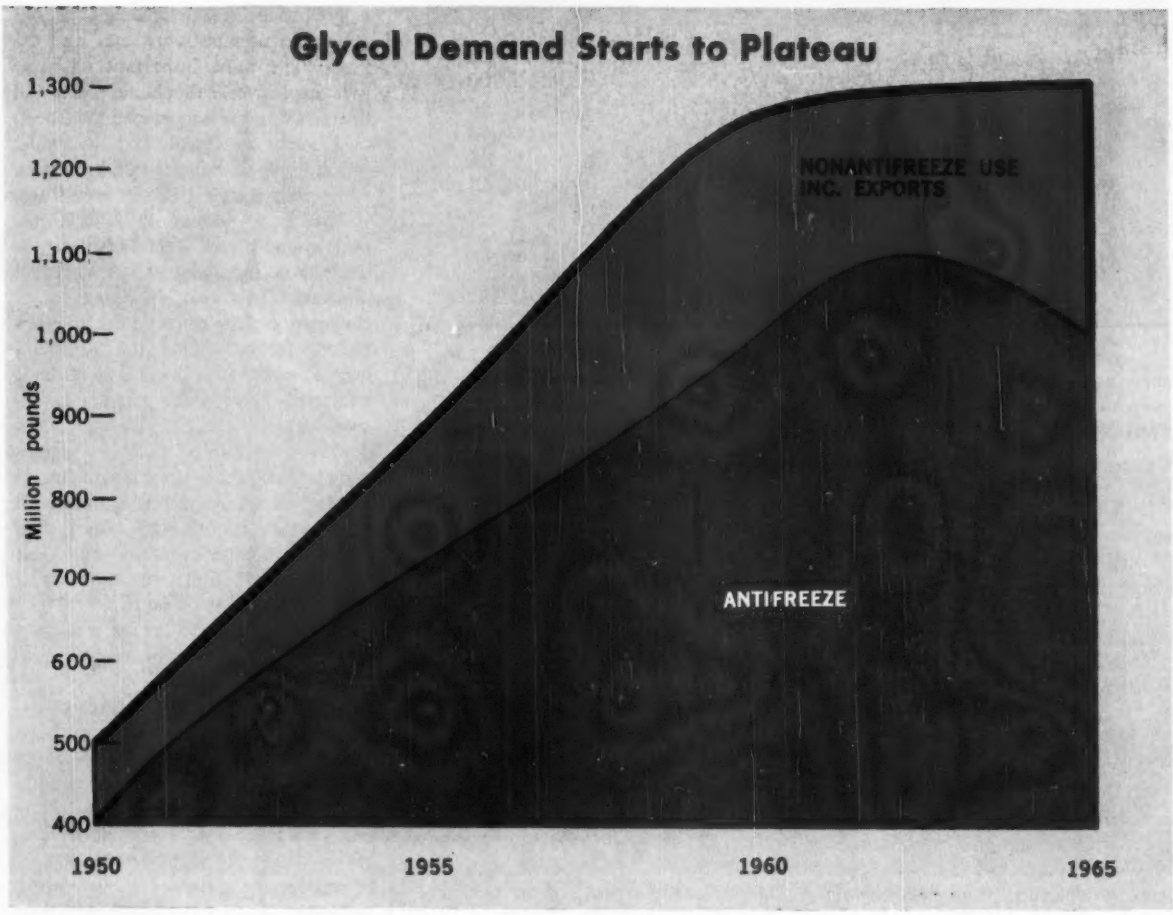

Glycol Challenge: Cloudy Antifreeze Future

After more than 10 years of skyrocketing growth, ethylene glycol is approaching the end of its boom days. Decreased market growth and substantial overcapacity appear inevitable in the years ahead. Reason: primarily the recent developments that seem certain to limit antifreeze markets.

Antifreeze has been largely responsible for the amazing market growth of ethylene glycol during the past decade. This end-use has consistently taken approximately 80% of the domestically produced material. Now three developments are taking place that would seriously affect the future of the antifreeze market:

(1) The growing rate of '61-model compact car production in Detroit.

(2) The introduction this year of "never drain," or multiseason protection antifreezes by Du Pont and Carbide.

(3) The possible introduction of gas turbine-powered automobiles in the not-too-distant future.

Taking the Consequences: The total U.S. ethylene glycol production in-place capacity is rated at approximately 1,770 million lbs./year. U.S. output during the '59 calendar year, however, was only about 1,215 million lbs., only 68% use of capacity.

This supply-demand picture is not expected to improve by '65. In fact an even greater overcapacity will probably evolve. A new producer, Houston Chemical, plans to construct a 100-million-lbs./year ethylene glycol production facility at Beaumont, Tex., which would bring total U.S. capacity to 1,870 million lbs. By '65, total U.S. consumption plus exports will probably amount to about 1,308 million lbs., 70% of capacity.

Compact Cars: Compact cars (less than 200-in. wheel base) each year have captured a larger share of U.S. automobile sales. For example, they accounted for 3½% of new car sales in the '58-model year, 8% in '59 and 22% in '60.

George Romney, president of American Motors, estimates that 50% of U.S. car production will be compacts during the '61-model year.

But even before the compact car gained importance in this country, the radiator capacities of new cars coming off the assembly lines in the U.S. were declining. Weighted average automobile radiator coolant capacities: 1955-56-model year, 19 qts.; '57, 18.3; '58-'59, 17.4; '60, 16.4.

The large-scale acceptance of com-

U. S. Ethylene Glycol End-Use
(Million pounds)

	1955	1960	1965
Antifreeze	730	1,000	1,000
Explosives	36	25	30
Cellophane	24	10	8
Polyester alkyd and ester gum resins	16	25	35
Synthetic fibers	10	40	85
Exports	52	130	100
Hydraulic fluids, industrial coolants, etc.	29	35	50
Total	897	1,265	1,308

pacts expected in '61 and succeeding years would certainly accelerate the trend toward smaller radiator capacities. Ten American-produced compacts will be marketed in the U.S. in '61. Their radiator coolant including heaters capacities:

Tempest (Pontiac), 12.6 qts.; Falcon, 9.3; Comet, 9.3; Special (Buick), 13.5; F-85 (Oldsmobile), 13; Valiant, 12; Lark, 12; Lancer (Dodge), 12; Rambler, 11; Corvair, none (air-cooled). Average capacity is 10.5 qts. Average capacity of conventional '61 models: 18.5 qts.

'Never Drain' Antifreezes: Du Pont and Carbide this month are introducing and promoting their "never drain" antifreezes Telar and Longlife. Both of these multiseason products represent a departure from the conventional antifreeze products on the market. They encourage reuse for several seasons (or year-round use for several years), a practice that antifreeze marketers and car manufacturers have opposed for many years.

In spite of the antifreeze producers' efforts, however, reuse has been growing. Du Pont and Carbide have seemingly decided to go along with the motorists; their advertising programs for Telar and Longlife actually encourage reuse while it seems clear that such a program would further cut down the size of the total U.S. antifreeze market, Du Pont disputes this. It feels that its Telar will not increase the number of reusers, that it will instead simply convert a large number of them to Telar.

Gas Turbine Power: The advent of gas turbine as a power plant for U.S. automobiles could kill the ailing antifreeze industry. Although Detroit auto makers have been working on gas turbines for several years, there is still little agreement in the industry on when gas turbine automobiles will appear on the American scene. The most optimistic industry spokesman is Chrysler's Tokum Huebner, who feels that gas-turbined automobiles will make their debut in '65.

Past, Present and Future: Antifreeze took 410 million lbs. of ethylene glycol in '50, 731 million lbs. in '55; and use of 1 billion lbs. in '60 is estimated. Although antifreeze's share of the total glycol market has remained constant during this decade, a consumption growth of 590 million lbs., 250%, was registered for glycol in this end-use. This is five times the growth of the total—permanant and nonpermanent types—antifreeze market. Reason—ethylene glycol (permanent) antifreeze growth has been largely at the expense of the methanol or volatile types.

Shares of the market by types of antifreeze: In '50, methanol, 50%; ethylene glycol, 46; others, 4. In '55, methanol, 28.5; ethylene glycol, 71.5. In '59, methanol, 11; ethylene glycol, 89.

This trend toward use of ethylene glycol is expected to continue during the next few years until methanol-type antifreeze has only 5-7% of the total market—those loyal to methanol or unwilling to use glycol in a potentially leaky cooling system.

Antifreeze Future: But the blitz by the compact cars and the introduction of never-drain antifreezes clearly point up that the exceptional growth days of ethylene glycol antifreeze are over. A slight consumption increase of this antifreeze is expected during the next two or three years. After that, consumption is expected to decline. By '65, the total quantity of ethylene glycol that will be sold as antifreeze will likely match the '60 level, approximately 1 billion lbs.

Nonantifreeze Uses: Over the past decade, about 20% of the domestically produced ethylene glycol has gone into nonantifreeze uses and exports. The most important of these uses: explosives, cellophane, resins and fibers. Of lesser importance have been uses such as brake and hydraulic fluids, and as humectants in textile, paper and leather-treating specialties.

During '55, about 35 million lbs. of ethylene glycol went into the production of industrial explosive glycol dinitrate. This year, however, glycol consumption for this end-use appears headed for or a drop to 25 million lbs. Reason: introduction of "do it yourself" ammonium nitrate explosives—much cheaper to use than conventional explosives. For explosives makers; there is some encouragement: ammonium nitrate is now used in all the mining applications for which it is suitable; consequently, no further market replacement of glycol dinitrate is expected. In fact, ethylene glycol is expected to realize moderate consumption growth in this end-use at least by '65.

In cellophane manufacture, ethylene glycol is used as a humectant-plasticizer. Its major competitors in this end-use is glycerin and propylene glycol. From '50 through '58, ethylene glycol showed consistant growth corresponding to the over-all growth of cellophane. However, the Food Amendments Act to the Food Drug and Cosmetic Act knocked out ethylene glycol showed consistent growth ment says that the safety of a packaging material that may migrate into food must be proved if the substance is not on FDA's GRAS list (generally recognized as safe). Consequently, ethylene glycol is no longer

U.S. Ethylene Glycol Capacity—1960-61

	Estimated million pounds
Union Carbide	755
Dow Chemical	350
Jefferson Chemical	180
Du Pont	150
Houston Chem. (due '61)	100
Olin Mathieson	100
Wyandotte Chemicals	90
Calcasieu Chemical	75
General Aniline & Film	35
Allied Chemical	35
Total	1,870

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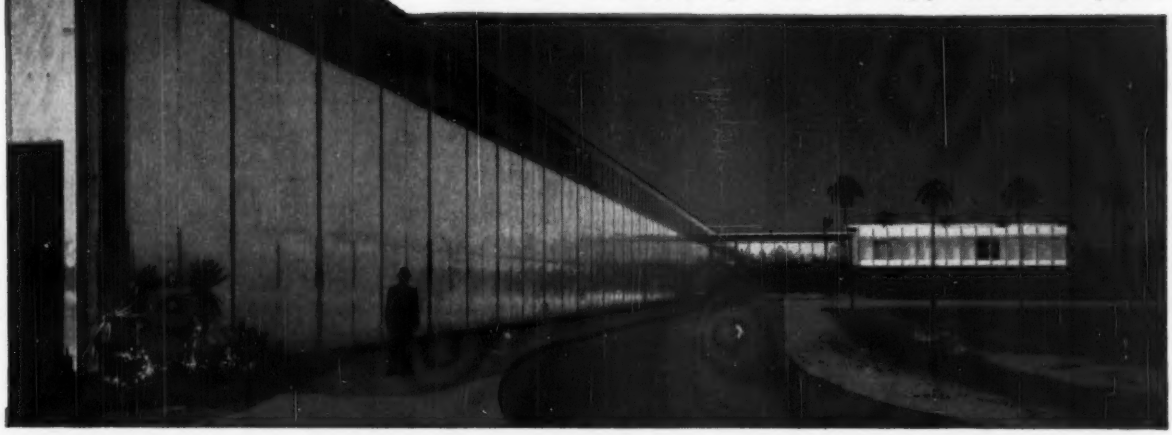

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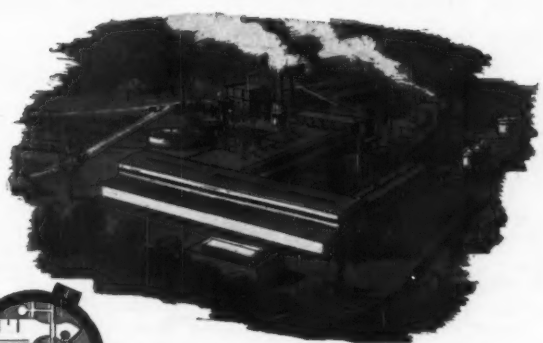

Paper Mill at St. Marys, Ga.

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used in large quantities by the cellophane manufacturers and no improvement in this situation is expected.

Ethylene glycol is used in the manufacture of a synthetic fiber, ethylene glycol terephthalate. Du Pont was the first to introduce this type of fiber to the market—Dacron. Since '53, when Du Pont's plant first went onstream, Dacron has sold well and Du Pont has had to expand Dacron production facilities to keep up with demand. Many other companies are jumping on the ethylene glycol terephthalate band wagon: Eastman Kodak with Kodel, Goodyear with Vitel and Fiber Industries (a Celanese-ICI joint venture).

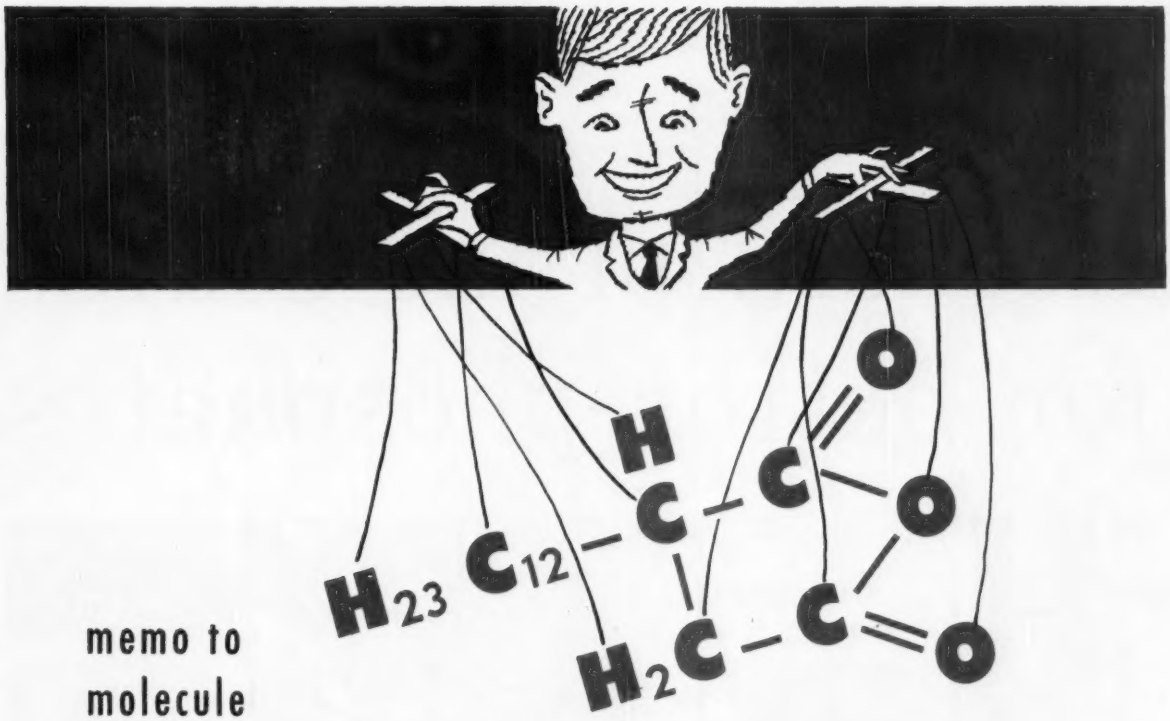
Thus, sales of this type fiber is expected to realize exceptional growth and reach 150 million lbs. by '62 or '63 and approximately 200 million lbs. by '65 (*CW Ethylene Report, April 25, '59*). Ethylene glycol consumption for this use will grow accordingly, reach 85 million lbs. by '65.

Ethylene glycol is also used in manufacturing alkyd, polyester and ester gum resins. The polyester resin (which is identical to the fiber in chemical composition) finds its major application in film (e.g., Mylar).

Moderate growth is predicted for ethylene glycol in the resin field during the next five years, and by '65 an estimated 35 million lbs. will be used.

In addition, glycol goes into hydraulic fluids, brake fluids and miscellaneous other products and processes. A market segment about equal to the "miscellanous manufacture" category is the export segment. This has vacillated considerably since '50 but the trend has been decidedly upward. In '50, for example, only 3 million lbs. were exported; during '60, an estimated 130 million lbs. will be sent abroad. The export of ethylene glycol from the U.S. serves only to fill the void—between total demand and domestic capacity in the respective countries. It is, therefore, hazardous to estimate ethylene glycol exports in '65 without knowledge of conditions and plans of each foreign market. Best bet: U.S. exports of ethylene glycol will stabilize at about 100 million lbs./year.

Plainly, the prospects for glycol are not encouraging, when the standard end-uses are considered. And so far, no brilliant new markets are in sight.



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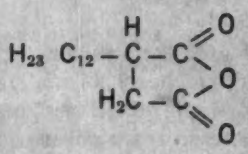

Note particularly the three points for addition reactions as steps toward new end products. Note also the positions of the oil-soluble alkenyl group and the hydrophilic reactive anhydride end.

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WRITE FOR TECHNICAL BULLETIN I-8

This six-page technical bulletin gives chemical and physical properties, principal reactions, infra-red absorption spectrogram, viscosity curve, suggested uses and a bibliography. A copy of this bulletin and a liberal working sample will be sent on request. Our Development Chemists will be glad to provide additional assistance to those whose work may lead to volume use of National Dodecenylsuccinic Anhydride.

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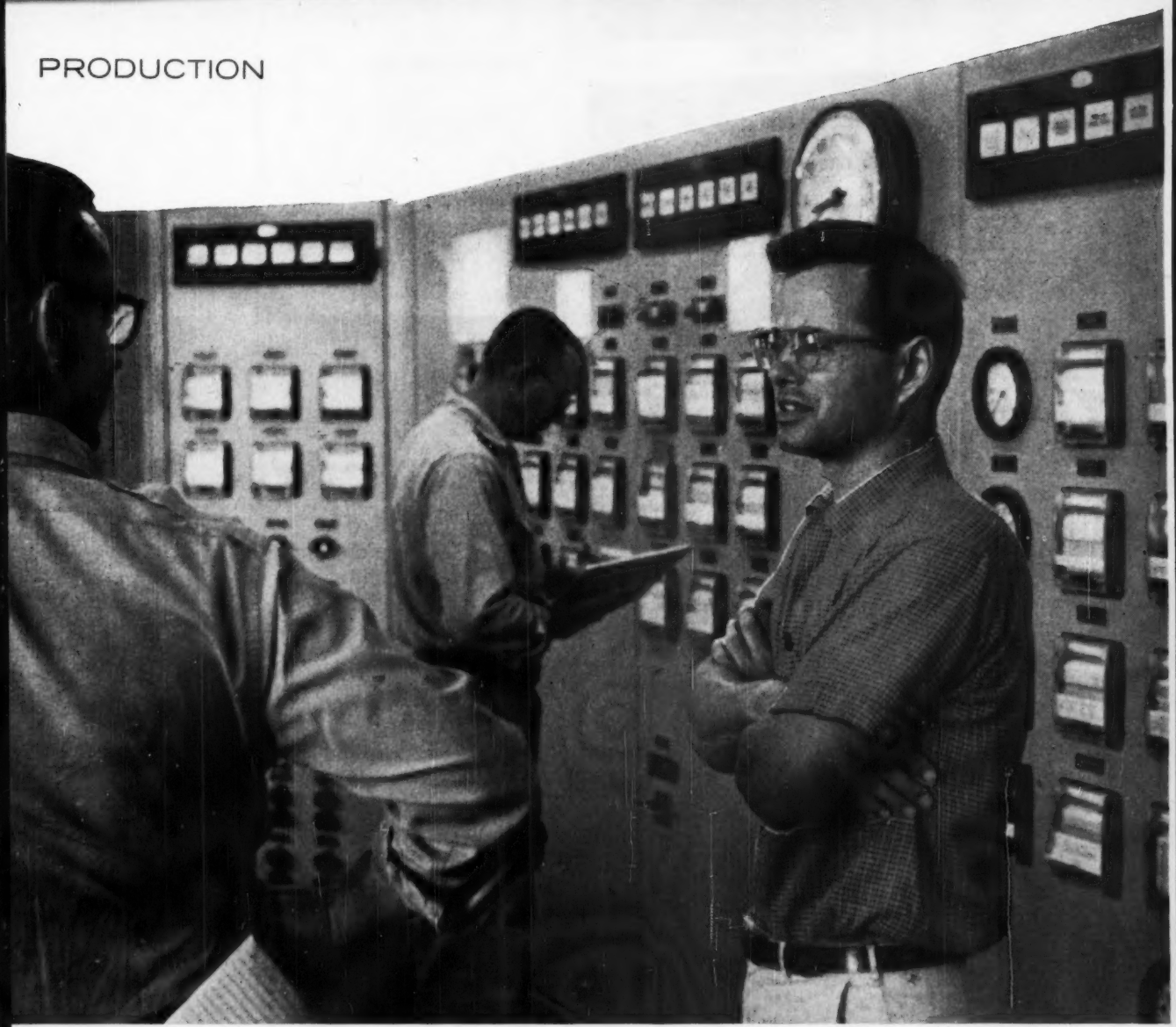


Freshly facing his fast-paced day, department head Dan Santini is briefed on events of night shifts.

Bright New Day Dawns for Process Chiefs

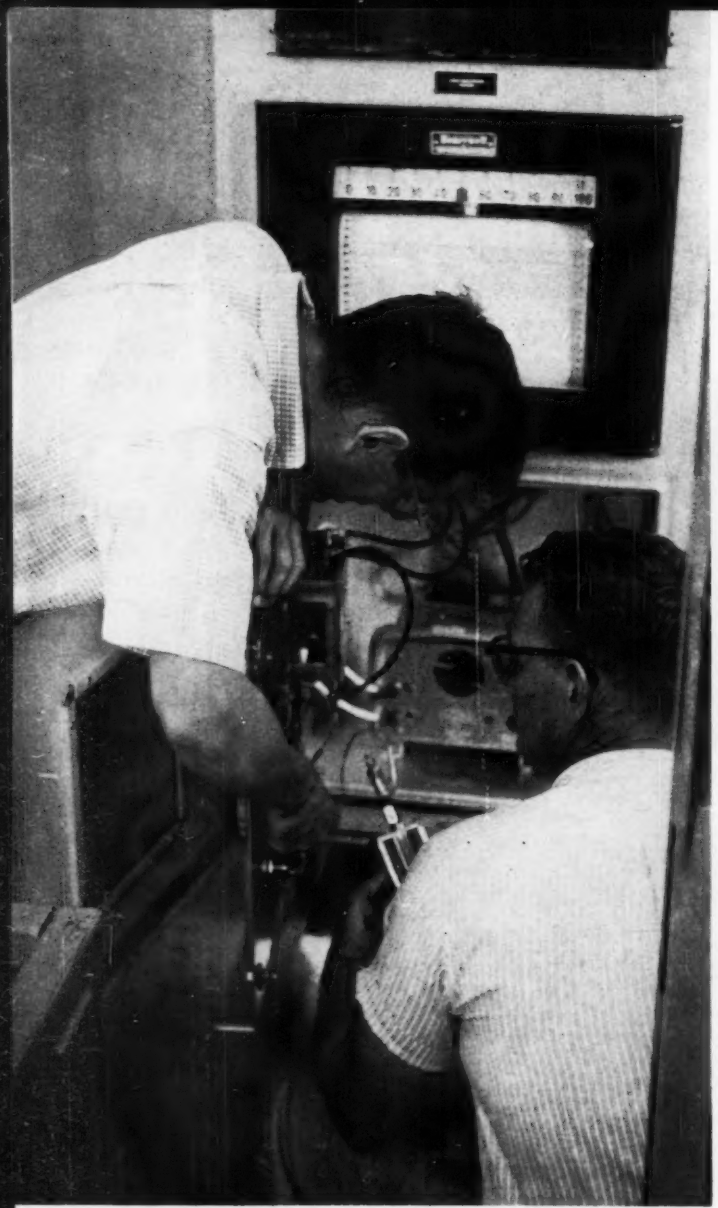
As chemical plants grow in size and complexity, a long-standing member of the management team is taking on new importance. In some plants he's called the department head, in others, the process supervisor. But regardless of title, he's the man who heads up a plant process unit.

Such a man is Dan Santini, department head of Union Carbide Chemicals' new peracetic acid unit at Institute, W. Va. His daily routine, pictured here, is just now settling into a pattern typical of that of chemical plant department heads. And because his unit is using a brand-new process (*CW, July 2, p. 44*) early phases of the job that have helped set the present daily pattern are still fresh, easily traced. They focus attention on the wide range of activities—in engineering, personnel relations and training, process operation and maintenance—that are increasing the stature of the process supervisor, making his job the key step up the ladder into top operating management.

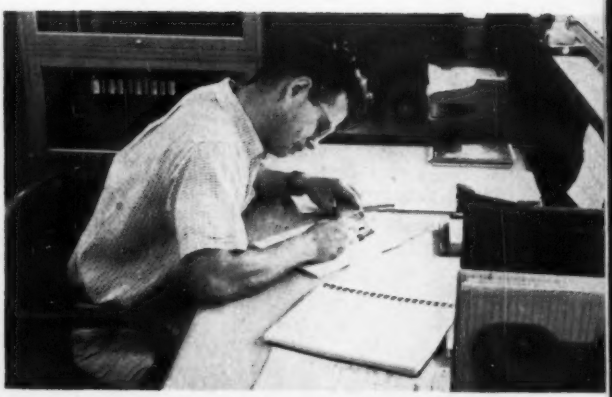
Santini's fast-paced day begins with a reading of the log that covers the 16 hours he has been away from the plant, and a conference with the chief operator about operating problems (*photo, above*). It ends with a discussion of operating instructions for the night-shift crews with his assistant, Vernon Rose (*photo, p. 126*), who will type them up. Sandwiched between these events are five or six meetings with other plant groups that are vital to keeping a smooth-running process unit.

But the days are now short and slow compared with the early days of process operation. Santini recalls times during the past year when he stayed long after normal quitting time, only to be roused from bed by a phone call in the early morning hours summoning him back to the plant to solve operating problems.

A good indication that daily routine



Santini gets first-hand look at instrument trouble spot.



Calculating process yields is next order of day's business.

Huddle with Daniels (left), Slaughter, sets process runs.

is now approaching a normal pattern: once Santini has finished conferring with the chief operator and checked yield calculations, he is often able to leave the unit for several hours to conduct business with other plant groups. Because the process is tricky (peracetic normally decomposes slowly but can be detonated under certain conditions) and the unit has been built on a remote hillside, Santini tries to schedule his visits to the main plant area with as many stops as possible.

He tries to time delivery of his production report with the coffee break time of his area supervisor, George Daniels. Over coffee, he is also likely to meet Assistant Plant Manager Stan Eastman, who was area supervisor when the new unit was started up.

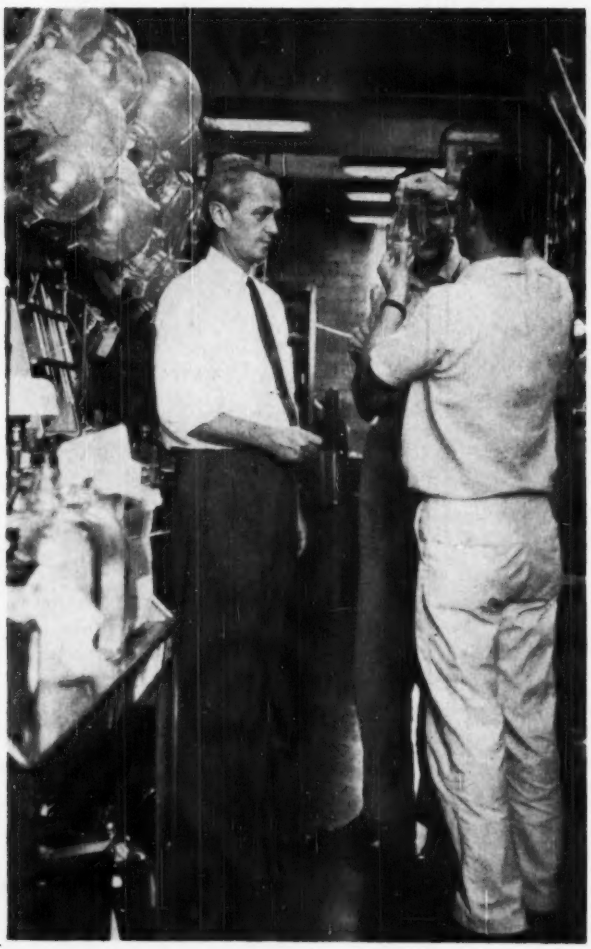
If he doesn't see John Slaughter, department head of the epoxides unit, during the coffee break, usually meets him in Daniels' office at a planning meeting. Santini's unit feeds the raw material to Slaughter's, which makes a variety of epoxy products (six of a family that could potentially number more than 800 are now in commercial production). Close coordination of the two units is required.

Santini is also likely to stop off in the maintenance shop, control laboratory, and the production records department. If he is planning equipment changes he also visits the plant engineering department. He occassionally phones the main engineering department in South Charleston, a few miles away. And, at some point, lunch is fitted in.

If all goes well, in the plant, he seldom meets formally with Plant Manager Luther Dickinson. In such a large plant these meetings may come only about once every two weeks.

Training Counts: The fact that all usually goes well and Santini is able to spend valuable time away from his process unit can be attributed in part to Carbide Chemicals' supervisory philosophy. The department head is picked long before a new process unit is built. He works with the engineering department from the earliest stages possible. During the last half of construction he is usually at the job

At control lab, Santini helps solve process sample problem.



Stopping at shop, Santini checks progress of parts repairs.

Production records get the once-over.

With engineering, Santini initiates proposed unit changes.

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site. He has a major hand in new-operator training.

In Santini's case, because he would head a brand-new process, he was brought in even earlier than usual, given a chance to work with the development group in the pilot plant.

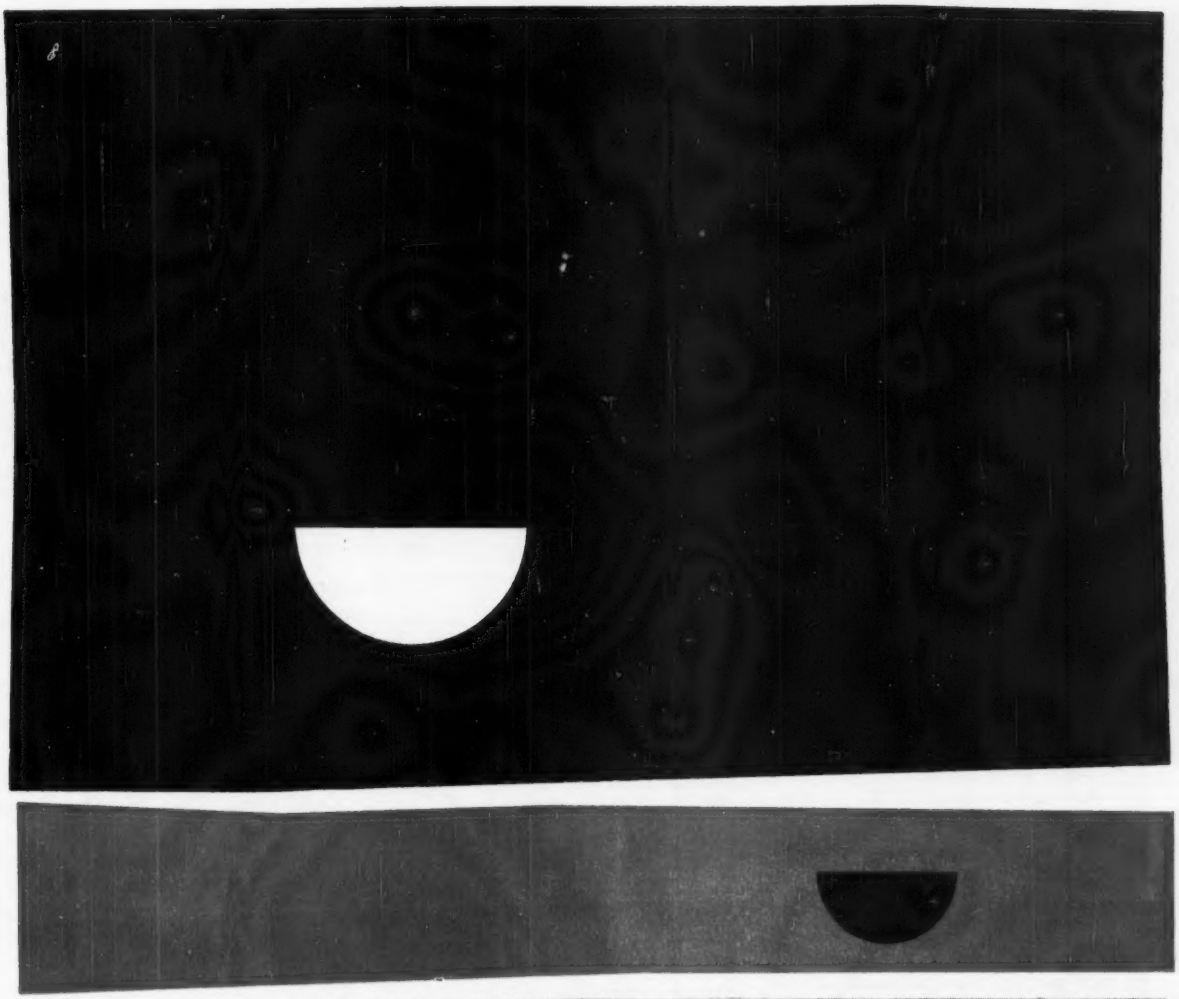
The decision to give him an early start has proved sound. Consequently he is now familiar with actual plant conditions, is able to offer constructive advice. For example, he has intimate knowledge of plant utilities—for instance a 200-psi. steam distribution system is used at South Charleston, a 400-psi. system at Institute, and that during the assembly of a fractionating column, trays must not be cocked.

Santini is given the authority to make many decisions on the spot. The theory: it is easier to help make decisions, offer constructive advice before action that may require alterations has been started by someone else.

Background Counts: Santini had the background for decision making, had been assistant department head of Carbide's styrene unit. His record included broad experience with Carbide in production, engineering, pilot-plant evaluation and development work before he assumed department head duties.

His experience in the peracetic pilot plant helped in decision making and in operator training. Carbide tried a new tack with this process, actually had some of the unit's opera-

At day's close, Santini maps out night-shift instructions with Rose.



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Agency—James J. McMahon, Inc.

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Agency—McCann-Erickson, Inc.

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Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

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Agency—Erwin Wasey Ruthrauff & Ryan, Inc.

AMOCO CHEMICAL CORP. 112
Agency—D'Arcy Advertising Co.

ANTARA CHEMICALS DIV. OF GENERAL ANILINE & FILM CORP. 103
Agency—The House of Twiss

*ARMOUR INDUSTRIAL CHEMICAL CO. 26-27
Agency—Foote, Cone & Belding

BAKER PERKINS, INC. 35
Agency—Price, Tanner & Willox, Inc.

BLOCKSON CHEMICAL CO. 9
Agency—Wm. Balsam Adv.

*BROWN CO. 120
Agency—J. M. Mathes, Inc. Adv.

BROWN & ROOT, INC. 36
Agency—D'Arcy Advertising Co.

CABOT, INC., GODFREY L. ..... 3rd Cover
Agency—Larcom Randall Adv., Inc.

*CELANESE CORP. OF AMERICA 24-25
Agency—Ellington & Co., Inc.

*CHASE BAG CO. 106
Agency—Hazard Advertising Co.

CHATTEM CHEMICALS 94
Agency—Lookout Advertising Agency

COLUMBIAN CARBON CO. 105
Agency—Donahue & Coe, Inc.

*COMMERCIAL SOLVENTS CORP. 23
Agency—Fuller & Smith & Ross, Inc.

COMPUTER SYSTEMS, INC. 76
Agency—Smith, Winters Mabuchi, Inc.

CORNING GLASS WORKS 30
Agency—The Rumrill Co., Inc.

DEHYDAG DEUTSCHE HYDRIERWERKE GMBH 94
Agency—Publicitas GMBH

DETREX CHEMICAL INDUSTRIES, INC. 4
Agency—Howell & Young Adv., Inc.

DIAMOND ALKALI CO. 84
Agency—Fuller & Smith & Ross, Inc.

DOW CHEMICAL CO., THE 12-13
Agency—MacManus, John & Adams, Inc.

DOW CORNING CORP. 89
Agency—Church & Guiswite Adv., Inc.

DRACCO DIV. FULLER CO. 44
Agency—The Jayme Organization, Inc.

*EASTMAN CHEMICAL PRODUCTS, INC. 75
Agency—Fred Wittner Co.

EASTERN STAINLESS STEEL CORP. 54
Agency—Van Sant Dugdale & Co., Inc.

EMERY INDUSTRIES, INC. 8
Agency—Farson, Huff & Northlich, Inc.

*ENJAY CHEMICAL CO., A DIV. OF HUMBLE OIL & REFINING CO. 97
Agency—McCann-Erickson, Inc.

ESSO STANDARD DIV. OF HUMBLE OIL & REFINING CO. 77
Agency—McCann-Erickson, Inc.

FMC CHLOR ALKALI DIV. OF FOOD MACHINERY CHEMICAL CORP. . 2nd Cover
Agency—James J. McMahon Adv.

FOSTER WHEELER CORP. 56
Agency—Arndt, Preston, Chapin Lamb & Keen, Inc.

GENERAL PUBLIC UTILITIES CORP. ... 104
Agency—Carpenter-Proctor, Inc.

GOODRICH CHEMICAL CO., B. F. 78
Agency—The Griswold-Eshleman Co.

GOODYEAR TIRE & RUBBER CO. 1
Agency—Kudner Adv., Agency

HARCHEM DIV. WALLACE & TIERNAN, INC. 82
Agency—Barber & Drullard, Inc.

HARDINGE COMPANY, INC. 108
Agency—Adams Associates, Inc.

HERCULES POWDER CO. 90
Agency—Fuller & Smith & Ross, Inc.

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Agency—Batten, Barton Durstine & Osborn, Inc.

*JEFFERSON CHEMICAL CO. 57, 59, 61
Agency—Robinson-Gerard-McGary, Inc.

JOHNS-MANVILLE CORP. 93
Agency—Cunningham & Walsh, Inc.

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Agency—Arthur A. Judson, Inc.

LEE COMPANY, H. D. 96
Agency—Grey Advertising Agency, Inc.

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Agency—Barber & Drullard, Inc.

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Agency—Aves, Shaw & Ring, Inc.

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Agency—Gardner Adv. Co.

NEVILLE CHEMICAL CO. 89
Agency—Bond & Starr, Inc.

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Agency—J. Walter Thompson Co.

PATTERSON KELLEY CO., INC. 22
Agency—G. M. Basford Co.

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Agency—The Rumrill Co., Inc.

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Agency—Batten, Barton, Durstine & Osborn, Inc.

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Agency—Ross Roy, Brooke, Smith, French & Dorrance, Inc.

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London E.C. 4 ..... E. E. Schirmer, N. Murphy, McGraw-Hill House, 95 Farringdon St., England.

Los Angeles 17 ..... Robert Yocom, 1125 West Sixth St., HUntley 2-5450

New York 36 ..... Charles Haines, B. A. Johnson, P. E. McPherson, Charles F. Onasch, L. Charles Todaro, 500 5th Ave., OXford 5-5959

Philadelphia 3 ..... William B. Hannum, Jr., J.E.B. Ladouceur, 6 Penn Center Plaza, LOcust 8-4330

Pittsburgh 22 ..... Duncan C. Stephens, 4 Gateway Center, EXpress 1-1314

Portland 4 ..... Scott B. Hubbard, Room 445, Pacific Bldg.

St. Louis 8 ..... R. J. Claussen, 3615 Olive St., Continental Bldg., JEfferson 5-4867

San Francisco 4 ..... William C. Woolston, 68 Post St., DOuglas 2-4600

***For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1960-61**

tors help run the pilot plant before moving over to the production unit. During pilot-plant operation, Santini was able to observe the emotional stability of the operators, decide whether they were suited to working on a potentially hazardous process.

Candidates receive 40 hours of basic operator training (a classroom course taken by all new operators). In addition, they receive training courses in reactive chemicals. A basic course in reactive chemicals explains potential hazards, operating procedures, precautions and procedures to follow in emergencies. It is followed by courses in the specific reactive chemicals that the operators will be working with (in this case, acetaldehyde and peracetic acid).

Santini, with the aid of an assistant, Phil Walden, wrote the instruction manuals (totalling about 100 pages) for the specific reactive chemicals courses.

Santini also wrote the operating manual for the unit over a period of four months, had it in the hands of the operators about one month before startup. The manual had 15 sections (e.g., a flow diagram; equipment and instrumentation descriptions; startup, operating and shutdown instructions; abnormal conditions and corrective action). It was the distillation of Santini's work with research, pilot plant, fire research, engineering and plant groups on the peracetic acid project.

"The operating manual is several hundred pages long, and because of operating revisions the job is never really done," says Santini.

Santini took the backbreaking schedule with characteristic calmness, even found time to draw smiles. Hidden among his many requisitions before plant startup: wooden flower boxes for the control room windows. He didn't get the flower boxes, but the operators showed their appreciation of the department head's sense of humor—a small flower garden now grows beside the control room. It is a good indication that plant management's selection of department heads is paying off in good personnel relations as well as in efficient operating units.

In fact, with the increase in size and complexity of today's chemical plants, payoff at the department-head level is essential.

Tracers TO THE CHEMICAL PROCESS INDUSTRIES

Published; each Saturday—closes 11 days in advance.

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POSITIONS VACANT

Operating Manager Wanted. Evaporated salt plant in south wants experienced superintendent to manage operation. Work record required to show ability to manage plant and handle people. Opportunity for right Person. P-5215, Chemical Week.

Chemist B.S./M.S. with minimum of 3 years experience in the application of latex and resins to textiles. Position involves project work on carpet backing, adhesion of rubber and textiles and similar assignments. Excellent opportunity. Write stating qualifications and salary requirements to Personnel Director, Callaway Mills, LaGrange, Georgia.

Chemist—Well established chemical company with growth plans has immediate opening for a chemist with background experience in wax and silicone emulsifications. Salary open. P-5348, Chemical Week.

SELLING OPPORTUNITY AVAILABLE

Salesman: Industrial Chemicals; Must be thoroughly familiar with marketing heavy organic and inorganic acids; organic solvents; plasticizers and intermediates. Experienced individual can earn substantial five figure income including liberal salary, profit sharing and other benefits with progressive, rapidly expanding distributor and manufacturer. Mercury Chemical Corp., Edison, N. J., Liberty 8-1540.

If you are a manufacturer seeking new or added sales outlets—or if you are a manufacturer's agent or chemicals distributor with the capacity, time and energy to take on additional lines—make your interests known in this column of Chemical Week. The right agent or jobber teamed up with the saleswise manufacturer makes the right combination for the hard selling days ahead. There's profit for both, which can be initiated through low-cost classified advertising. Write Employment Opportunities, Chemical Week. P.O. Box 12, New York 36, N.Y.

POSITIONS WANTED

Sales executive or executive sales age 40. Thoroughly experienced. Industrial inorganic & organic sales to all types & size business. Prefer S.E. Excellent record. PW-5397, Chemical Week.

Experienced and Successful chemical salesman moving to Florida about January 1st 1961 would like to represent one or two companies in the state. PW-5332, Chemical Week.

CONTRACT WORK WANTED

Custom Grinding-Ultra Fine or Coarse-Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO^2 installation for Nylon, Teflon and Heat Sensitive Materials. A Cramer Corp., 108881 S. Central Avenue, Box 682, Oak Lawn, Illinois.

CONTRACT WORK WANTED

Colombia S.A.—Chemical manufacturer, desires to contact U.S. manufacturers of chemical specialties interested in the Colombian market. Manufacturing facilities and a nation-wide sales organization available. Products might be sold under your own trade-marks if desired. Excellent references. CWW-5350, Chemical Week.

SPECIAL SERVICES

Distillation facilities available. Open time on 5 million gals. annually. North Jersey. Toll basis or will purchase your crudes. Long term lease of plant also considered. SS-5411, Chemical Week.

BUSINESS OPPORTUNITY

Ink Varnish Co. wishes to diversify. Can you put us into new profitable field? Would like to acquire man with complete formulation, production, & market knowledge, & contacts, wishing a desirable "home". Would also consider purchase of specialty chemical Co.—Metro. N.Y. area. BO-5298, Chemical Week.

FOR SALE

Filimaster—Semi & Fully Automatic package filling machines. $800.00 up. Stuvesant Engineering Corp. Norwood, New Jersey.

Liquidation, $8,000,000 Alcohol Plant at Omaha, Nebraska. Dryers, Filters, Stills Evaporators, Exchangers, Tanks, Pumps, etc. Send for circular. Perry, 1415 N. Sixth St., Phila. 22, Pa.

Vulcan 10'x11' dia.x 175' long rotary kiln ¾" shell 2 tires firing hood etc. Very attractive price. Perry, 1415 N. Sixth St., Phila., Pa.

7316 s.s. distillation column 96" dia. x 37" high. 30 bubble cap. trays. Like new. Perry, 1415 N. Sixth St., Phila., Pa.

2-316 s.s. heat exchangers 800 sq. ft. ⅝" O.D. tubes. Perry, 1415 N. Sixth St., Phila., Pa.

Oliver Continuous Vacuum Precoat Filter, (New-Unused) 5'3" dia. x 10' Face, Monel Construction. FS-5381, Chemical Week.

WANTED/FOR SALE

This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division. Chemical Week, P.O. Box 12, N. Y. 36, N. Y., LOngacre 4-3000.

WANTED

Wanted: Reliable supplier of pyrazolones and/or substituted Phenyl Hydrazines for substantial industrial outlet. Need supplier or chemist with mfg. info. W-5410, Chemical Week.

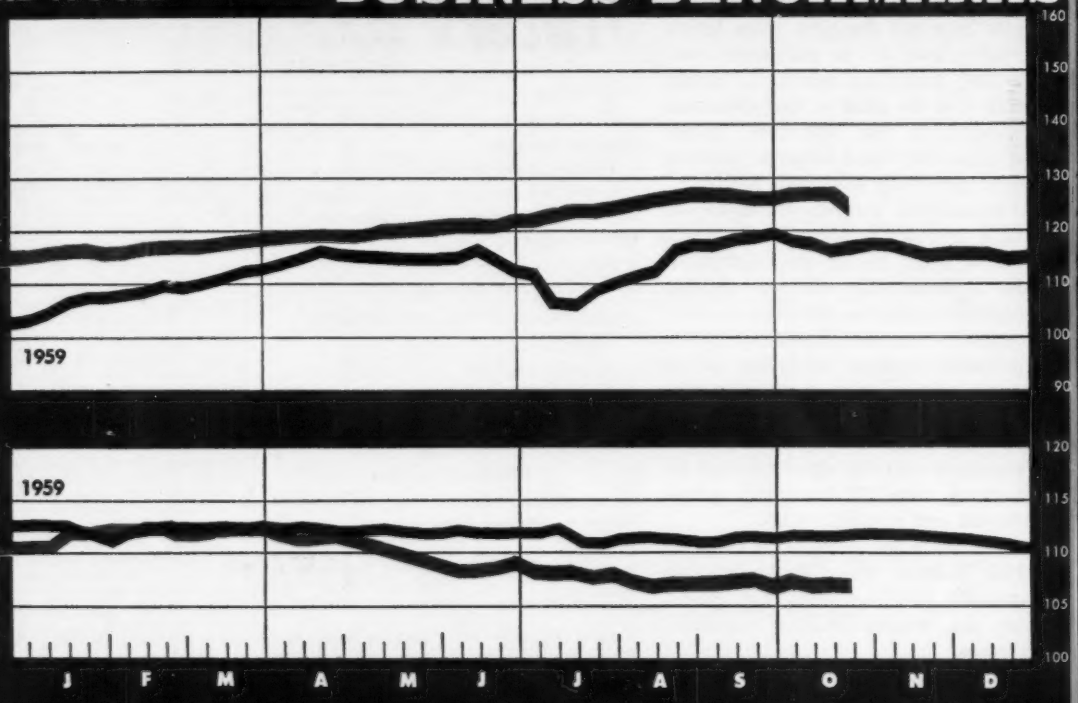
CHEMICALS FOR SALE

60 Lypks. Aluminum Stearate 32¢ lb. Bulk DOS Plast. 32¢/lb. (dark). Bulk DBS Plast. 33¢/lb. w/w. Bulk Acetone Redistilled 43¢/gal. FS-5413, Chemical Week.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."

BUSINESS BENCHMARKS



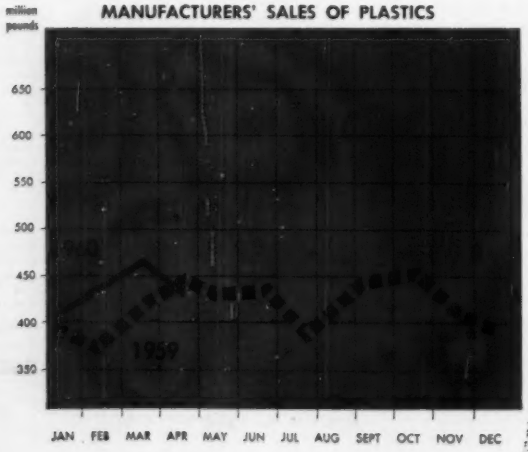
OCTOBER 8, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1957=100)	122.1	125.4	119.3
Chemical Week wholesale price index (1947=100)	106.5	106.9	110.9
Stock price index (12 firms, Standard & Poor's)	44.43	46.23	57.04
Steel ingot output (thousand tons)	1,545	1,547	362
Electric power (million kilowatt-hours)	14,156	13,903	12,878
Crude oil and condensate (daily av., thousand bbls.)	6,877	6,847	6,846

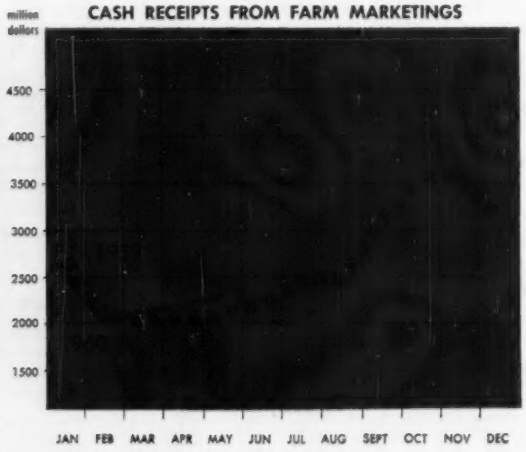
PRODUCTION INDICATORS (1957=100)	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	107	103	103
Nondurable goods manufacturing	117	110	115
Durable goods manufacturing	99	99	93
Chemicals and allied products	118.9	124.6	115.2
Industrial chemicals	129.5	128.9	118.5
Petroleum and coal products	1130.0	111.4	109.8

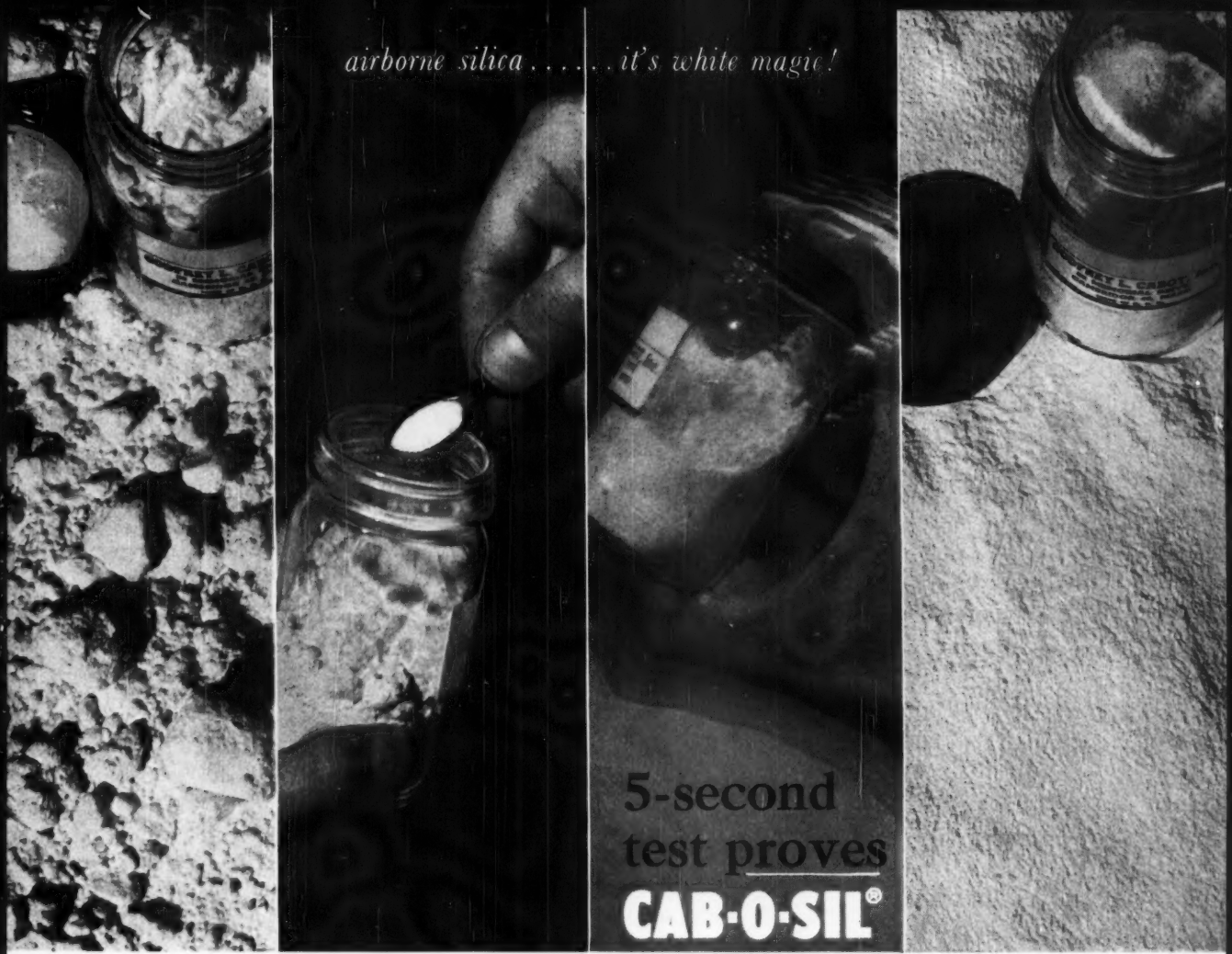
CHEMICAL CUSTOMERS CLOSE-UP

MANUFACTURERS' SALES OF PLASTICS



CASH RECEIPTS FROM FARM MARKETINGS





Try the 5-second test for yourself:

1) *start with caky powder (it's sulfur here).*
2) *add just 0.5% Cab-o-sil by weight.*
3) *shake vigorously for 5 seconds.*
4) *voila! — you have a smooth, free-flowing powder!*

works "free-flow" magic!

What simpler way to prove for yourself the genuinely amazing conditioning effects possible with just a pinch of Cab-o-sil on caky powders? Cab-o-sil has already proved highly effective not only with sulfur, but with a wide variety of "problem" powders including urea and zinc oxide, insecticides, and rubber accelerators.

And here's a notable fact to remember: Cab-o-sil does the job in spectacularly minute amounts — as little as one quarter of one per cent by volume in some cases.

Anticaking is just one of a long list of immensely useful characteristics of this versatile raw material. Here are a few of the ways Cab-o-sil is currently being put to work:

We invite you to use the coupon below.

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USES:

- **Thixotropic, thickening, gelling agent** — lubricating oils, greases, polyester resins, epoxy resins, plastisols, plastigels, organosols
- **Suspending agent** — paints
- **Flatting agent** — varnishes, lacquers, organosols, plastisols
- **Reinforcing agent** — rubber, silicone, latex film
- **Anticaking agent** — sulfur, insecticides
- **Antislip agent**—solvent-base floor waxes
- **Precoating material** — reproduction paper
- **Low temperature thermal insulation**
- **Pharmaceuticals and cosmetics** — **(See bulletin #cpha-1)**

Please send ☐ free Cab-o-sil sample and other technical data checked

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( ) Cab-o-sil in Butyl Rubber (#crub-2)
( ) Cab-o-sil in Dipped Latex Films (#crub-3)
( ) Cab-o-sil in the Lubricating Grease Industry (#cgre-2)
( ) Aqueous Dispersions of Cab-o-sil (#cmis-2)
( ) A Flatting Agent for Varnishes (#cpai-3)
( ) Cab-o-sil in the Reproduction Paper Industry (#cpap-1)
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( ) Cab-o-sil in Automobile Polishes (#cpol-1)
( ) Cab-o-sil in Pharmaceuticals and Cosmetics (#cpha-1)

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